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INSIDE

Does "Auto-anticoagulation" Protect Against VTE in Patients with Liver Disease?

ABSTRACT & COMMENTARY

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Dr. Pierson reports no financial relationships relevant to this field of study.

This article originally appeared in the July 2010 issue of Critical Care Alert. *It was peer reviewed by William Thompson, MD. Dr. Thompson is Associate Professor of Medicine, University of Washington; he reports no financial relationships relevant to this field of study.*

Synopsis: *In this retrospective study of patients hospitalized because of severe chronic liver disease, venous thromboembolism was relatively common and "auto-anticoagulation" in the form of an elevated INR had no apparent protective effect.*

Source: Dabbagh O, et al. Coagulopathy does not protect against venous thromboembolism in hospitalized patients with chronic liver disease. *Chest.* 2010;137:1145-1149.

THIS STUDY SOUGHT TO DETERMINE WHETHER THE COAGULOPATHY associated with chronic liver disease — specifically the elevated International Normalized Ratio (INR) frequently present in patients with advanced disease — is protective against venous thromboembolism (VTE) in hospitalized patients. The investigators performed a retrospective chart review of all patients with diagnosis codes for chronic liver disease and cirrhosis who were admitted to their tertiary care university hospital during an eight-year period. Excluding patients on anticoagulants at the time of admission, those with previously known VTE, and subsequent admissions in individuals hospitalized more than once, they recorded the highest INR measured during admission and also reviewed the findings of all investigations for VTE (spiral computed tomography, lower-extremity venous Doppler ultrasound, ventilation-perfusion scanning, or pulmonary angiography) that were carried out in the patients during admission. The diagnosis of chronic liver disease could be either biopsy-proven

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or clinical, and only hospitalizations that were primarily for this condition were included.

Of 193 patients meeting the entry criteria, three were excluded for incomplete data, leaving 190 patients in the cohort. Most of them had alcohol-related liver disease. They were divided into quartiles according to the highest recorded INR during the admission: < 1.4 (n = 47), 1.4-1.7 (n = 61), 1.7-2.2 (n = 38), and > 2.2 (n = 44). Although, as expected, patients in the higher quartiles had increasing serum bilirubin and lower albumin and platelet counts, as well as progressively worse Child-Pugh scores, the patients were similar demographically and there were no interquartile differences in either VTE risk assessment or history of VTE. Forty-three percent of the patients underwent one or more diagnostic test for VTE during hospitalization, of which venous ultrasound and spiral CT were most often used. Prophylaxis against deep venous thrombosis (DVT), either mechanical or pharmacologic, was administered in 25% of the patients, without differences in distribution among the quartiles.

In-hospital VTE was diagnosed in 12 patients (6.3%), without detectable differences according to whether DVT prophylaxis was used. One case (4.2% of 24 patients) occurred in a patient who was in Child-Pugh stage A, three cases (4.6% of 66 patients) in stage B, and eight cases (8% of 100 patients) in stage C; these differences in incidence, according to the severity of liver disease, were not statistically significant. Noting that the overall incidence of diagnosed VTE in this cohort was higher than that previously reported in cirrhotic patients, the authors conclude that, consistent with the findings of previous studies, the "auto-anticoagulation" manifested by an elevated INR in patients with chronic liver disease does not protect against VTE.

■ COMMENTARY

This is not the first study to demonstrate a lack of protective effect against VTE by the coagulopathy of chronic liver disease. However, it is a well-done study, and the authors make a number of good points in their discussion. This is the first study to assess the relationship between severity of coagulopathy and incidence of VTE. That an elevated INR in patients hospitalized for liver problems is not protective is emphasized by the findings that more than half of the new cases of VTE occurred in patients with INR > 1.6, and that the risk persisted even at values exceeding 2.2. The authors also documented a low rate of DVT prophylaxis, which seems inappropriate given the relatively high rate of incident VTE. And the latter was likely an underestimation, given that 57% of the patients had no evaluation for VTE.

The lesson from this study might seem obvious, but it still needs emphasis. A target-range INR is protective against DVT when it is achieved by warfarin therapy, but not when it occurs as a manifestation of liver disease-associated coagulopathy. This is a case of "bad news and bad news": An elevated INR in a patient with cirrhosis predisposes to bleeding and also does not protect against thrombosis. ■

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Myocardial Infarction

ABSTRACT & COMMENTARY

By Michael H. Crawford, MD
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Dr. Crawford is on the speaker's bureau for Pfizer.

This article originally appeared in the July 2010 Clinical Cardiology Alert. *It was peer reviewed by Ethan Weiss, MD. Dr. Weiss is Assistant Professor of Medicine, Division of Cardiology and CVRI, University of California, San Francisco; he reports no financial relationships relevant to this field of study.*

Source: Milonas C, et al. Effect of angiotensin-converting enzyme inhibition on one-year mortality and frequency of repeat acute myocardial infarction in patients with acute myocardial infarction. *Am J Cardiol*. 2010;105:1229-1234.

THE USE OF ANGIOTENSIN CONVERTING ENZYME (ACE) INHIBITORS in all acute myocardial infarction (MI) patients is controversial. Thus, these investigators from the Register of Information and Knowledge about Swedish Heart Intensive Care Admissions (RIKS-HIA) examined the association between ACE inhibitor therapy and mortality in

unselected patients with acute MI. This registry started in 1995 and includes almost all patients admitted to Swedish hospitals with acute coronary syndromes until 2005. The patient population for this study is 105,224 patients with acute MI who were not treated with ACE inhibitors on admission. They were followed for one year for mortality and repeat admission for acute MI. Two groups were compared: those put on ACE inhibitors at discharge and those not. Since there were differences in baseline characteristics between the two groups, a propensity score was calculated for each patient and used to adjust for baseline characteristics and treatment.

Results: Thirty-seven percent of the patients received ACE inhibitors at discharge; 30% in 1995, increasing to 43% in 2005. The unadjusted one-year mortality rate was less in those treated with ACE inhibitors as compared to those not (10.6% vs. 12.1%, $p < 0.001$). After adjustment, the risk ratio for mortality in those on treatment was 24% less (RR = 0.76, 95% CI 0.73-0.80). The benefit was largely confined to those with a history of current heart failure. Also, in those where it was measured, the ACE inhibitor benefit was greater as the glomerular filtration rate and ejection fraction decreased. Readmission for acute MI was decreased 7% when adjusted (RR = 0.93, 95% CI 0.9-0.96), with the major effect seen in those with ST elevation MI and systolic left ventricular dysfunction (LV). The authors concluded that ACE-inhibitor treatment prior to discharge of unselected acute MI patients was associated with reduced one-year mortality, but mainly in those with heart failure and renal dysfunction. Also, there was a small reduction in recurrent MI mainly in patients with STEMI and LV dysfunction.

■ COMMENTARY

Current guidelines recommend ACE inhibitors for acute MI with preserved LV function, but there is little data to support this practice. Previous trials have shown benefits largely in high-risk patients such as those with heart failure or reduced LV function. The guidelines are based upon data from patients with stable CAD treated over many years. So even though this is not a randomized trial, the results are of interest because unselected patients with acute MI, not treated on admission with ACE inhibitors, were analyzed based upon whether or not they received ACE inhibitors at discharge. This study represents the largest observational study of this issue, so propensity scoring adjustments for differing baseline characteristics could be made with adequate power. The results showed that ACE inhibitors reduce mortality mainly in patients with heart failure and renal dysfunction, and they reduce recurrent MI largely in patients with STEMI and reduced LV function. If I were revising the guidelines for post-MI care, I would recommend ACE inhibitors for acute MI patients if they had STEMI, LV dysfunction, heart failure, or renal dysfunction (IIa). ACE inhibitor treatment for all acute MIs would be IIb. Of course, ACE inhibitors could be used for other indications such as hypertension.

There are some caveats to this study. Propensity score adjustments may not account for all differences between groups. We do not have data on the actual ACE inhibitor the patients were on or the dose. Not all ACE inhibitors may be the same, and prior studies have shown variable effects depending on dose. This study was completed before the widespread use of angiotensin receptor blocking drugs (ARB). They accounted for < 3% of prescriptions for drugs targeting the renin-angiotensin system in this study. Also, we do not know the effect of the drugs on blood pressure in this study, which could be an important consideration.

The benefits observed in those with renal dysfunction are interesting because we often do not start ACE inhibitors if there is renal dysfunction. Also, ACE inhibitors are indicated in diabetics to prevent renal damage. Of those discharged on ACE inhibitors, 22% had diabetes. But, in subgroup analyses, diabetes did not influence the results of the study. Less than 2% of patients in the study had renal failure, but the number with renal dysfunction is not given.

Partially because the study started in 1995, only about one-third had coronary angiography and one-quarter revascularization. About half the patients were on statins. Thus, more aggressive therapy for acute MI could alter the results of this study. The major message I take from this study is that ACE inhibitors or ARBs should be reserved for those following acute MI who have definite indications such as heart failure, LV dysfunction, hypertension, or diabetes, and should be more strongly considered in those with renal dysfunction. ■

Acinetobacter Spreads its Wings

ABSTRACT & COMMENTARY

By Ellen Jo Baron, PhD, D(ABMM)

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Dr. Baron reports no financial relationships relevant to this field of study.

This article originally appeared in the July 2010 issue of Infectious Disease Alert. *It was edited by Stan Deresinski, MD, FACP, and peer reviewed by Timothy Jenkins, MD. Dr. Deresinski is Clinical Professor of Medicine, Stanford University; Associate Chief of Infectious Diseases, Santa Clara Valley Medical Center, and Dr. Jenkins is Assistant Professor of Medicine, University of Colorado, Denver Health Sciences Center. Dr. Deresinski serves on the speaker's bureau for Merck, Pharmacia, GlaxoSmithKline, Pfizer, Bayer, and Wyeth, and does research for Merck, and Dr. Jenkins reports no financial relationships relevant to this field of study.*

Synopsis: *Serious infections caused by* Acinetobacter baumannii *are appearing in the community, spread by patients who acquired the organism in the hospital setting, and conversely, the organism is being introduced into the hospital from long-term nursing care patient settings. Resistance to antimicrobial agents has increased over the six-year study period, along with the severity of disease.*

Source: Sengstock DM, et al. Multidrug-resistant *Acinetobacter baumannii*: An emerging pathogen among older adults in community hospitals and nursing homes. *Clin Infect Dis*. 2010:50:1611-1616.

We have all watched as *Acinetobacter* morphed from an infrequently seen isolate of little clinical consequence to a frightening pathogen. Microbiologists used to recover *Acinetobacter lwoffii* from vaginal secretions in the days when we thought, incorrectly, that gram-negative rods were pathogens in that site. Now we are faced with *Acinetobacter baumannii*, currently the most common *Acinetobacter* species seen in clinical samples, causing pneumonia, wound infections, urinary tract infections, and sepsis. The organism does not inherently have any toxins or cytolysins, and other conventional virulence factors have not been detected, as reviewed by Gordon and Wareham.[1] *Acinetobacter* does form biofilms, a trait that no doubt helps it survive in the environment, from which it infects humans.[2] And like *Salmonella, Yersinia pestis, Bacillus anthracis,* and other pathogenic siderophore-producing microbes, it accumulates iron from the environment and its host.[3] Probably the most important reason for its increasing importance is its multidrug resistance. In fact, almost every hospital laboratory in the United States has isolated at least one *A. baumannii* that is resistant to every antimicrobial that can be tested. Carbapenem resistance due to the $bla_{\text{OXA-23}}$ gene, common among injured Iraqi- and Afghanistan-conflict veterans, and spreading rapidly in the civilian population, was associated with prolonged stay in both the intensive care unit and the hospital, according to a recent report from a Veterans Administration system group studying patients at Walter Reed Army Medical Center.[4] However, a recent study from an excellent healthcare system in Porto Alegre, Brazil, showed that the risk of 30-day mortality in patients infected with a carbapenem-resistant outbreak strain of *A. baumannii* was related more to the patient's underlying condition and severity of infection at presentation than to the use of inappropriate therapy.[5] On the other hand, only one-third of the 66 patients received the correct therapy, due to many physicians underestimating the importance of the isolate. Early appropriate therapy has been shown in other studies to reduce mortality.[6] And the major study summarized here also found increasing morbidity related to increasing antibiotic resistance.

Its role as a hospital-acquired pathogen is well described, but Sengstock and colleagues extended their study to include all patients older than 60 years from whom *Acinetobacter* was isolated by a central reference microbiology laboratory over the years 2003-2008.[7] The laboratory serves four community hospitals in suburban Detroit. Only the first isolate from each patient was included in the database. The patient groups were divided into "community dwellings" and "nursing home dwellings"; patients admitted from long-term acute-care facilities were excluded, although the authors concluded that patients discharged to such facilities from hospitals were one source of multidrug-resistant *Acinetobacter* in the community. The 840 patients whose cultures were analyzed in the study included 560 community-dwelling (admitted from home) and 280 nursing home-dwelling (admitted from the nursing home) patients. Nosocomial infections were those acquired > 2 days after admission. Thus, the study allowed the authors to evaluate *Acinetobacter* prevalence in patients who acquired their infection in the hospital, in the community, or in a nursing home. More than half of cultures were from respiratory secretions (56%), but others came from wounds (22%), urine (12%), blood or catheter tip (10%), and stool (0.3%). These sources immediately bring up a potential problem, since *Acinetobacter* is certainly not a pathogen in stool. This is particularly bothersome with regard to sputum, where the organism is more often a colonizer than a pathogen. The publication reveals no information on laboratory protocols for determining significance of organisms and determining the extent of further workup, such as screening Gram stains of respiratory samples, a long-time proven method used to direct the culture processing of such samples.[8] The authors acknowledge that colonization was not differentiated from infection.

Given that caveat, the findings about the organisms themselves are certainly valid. From a relatively low number during 2003-2006, but dramatically exploding in 2007, the percentage of strains resistant to imipenem and/or ampicillin/sulbactam rose from < 5% to > 30%, and the percentage of strains considered pan-resistant (resistant to all eight antibiotic classes tested: ampicillin/sulbactam, aztreonam, cephalosporins, aminoglycosides, quinolones, carbapenems, tetracycline, and trimethoprim/sulfamethoxazole) rose from < 3% to a high of > 20%. The relative percentages of pan-resistant *Acinetobacter* isolates recovered from patients whose infection was acquired nosocomially (defined as infections acquired by any patient after day two post-admission) and from patients admitted from nursing homes whose infection manifested within the first two days of admission (nursing home-dwelling) also rose steadily after 2005. In contrast, non-nosocomial isolates from community-dwelling patients showed relatively stable levels of pan resistance over the last three years of the study.

Even the overall numbers of *Acinetobacter* isolates increased from 189 in 2003 to 329 in 2007, and to 214 in 2008, a 25% increase among this older adult patient cohort ($p < 0.001$). And regardless of their previous habitat, patients with *Acinetobacter* infections had high rates of adverse outcomes. Only 25% of previously community-dwelling patients were released to home, with 31% being released to hospice care or were dying. Another 27% were released to acute-care, long-term care facilities. Fifty percent of previously nursing home-dwelling patients were released back to the home; 20% were transferred to other acute-care facilities, and 30% were referred to hospice or died. The authors found a direct correlation between increasing antibiotic resistance and adverse outcome, although they noted that they could not establish causation. Of note, half of community-dwelling patients whose infection was caused by a pan-resistant strain expired; another third went to long-term acute-care facilities, and only 6 of 45 patients were discharged to home. Patients discharged to nursing homes hosted strains of increasing resistance over the study period.

■ **COMMENTARY**

One message to take away from this large study is that both hospitals and long-term care facilities (nursing homes) are likely feeding resistant *Acinetobacter* to each other, which calls for a region-wide or system-wide strategy for reducing the spread of these strains. As has been witnessed with many other pathogens, failure to take measures early allows widespread dissemination of resistance factors. It may already be too late to prevent this under-rated pathogen from becoming the next MRSA or *Clostridium difficile*. And it may be stating the obvious to remind ourselves that while at least a few new antimicrobials are being developed for MRSA and *C. difficile, Acinetobacter* has yet to reach the "status" of meriting its very own antibiotic. ■

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Diarrhea vs. Death: You Decide

ABSTRACT & COMMENTARY

By Barbara A. Phillips, MD, MSPH

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This article originally appeared in the June 29, 2010 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 boards of Amylin, Kowa, Novo Nordisk, and serves on the speaker's bureau for Boehringer Ingelheim and Novo Nordisk. Dr. Roberts reports no financial relationships relevant to this field of study.*

Synopsis: *Early antibiotic administration was associated with reduced likelihood of death, mechanical ventilation, and readmission (but increased risk of* Clostridium difficile *infection) among patients hospitalized for acute exacerbations of COPD.*

Source: Rothberg MB, et al. Antibiotic therapy and treatment failure in patients hospitalized for acute exacerbations of chronic obstructive pulmonary disease. *JAMA* 2010;303:2035-2042.

THIS REPORT IS THE RESULT OF A RETROSPECTIVE, NONRANDOMIZED chart review of 312 hospitals over a two-year period. The hypothesis was probably that use of antibiotics in patients who were hospitalized for chronic obstructive pulmonary disease (COPD) exacerbations would improve outcomes.

Participating hospitals were primarily small- to medium-

sized nonteaching hospitals located in urban areas. The investigators were able to collect and review extensive data for the patients included in this study, including age, sex, race, marital and insurance status, principal diagnosis, comorbidities, self-reported race, and specialty of the attending physician. In addition, they were able to determine which tests and treatments patients received. They were also able to distinguish between those elements of patient management that were guideline-recommended and those that were not. Patients were included if they were at least 40 years of age and had a principal diagnosis of an acute exacerbation of COPD or emphysema, or if they had respiratory failure coupled with a secondary diagnosis of COPD exacerbation. Patients were excluded if they had another indication for antibiotics, a length of stay shorter than two days, a secondary diagnosis of pulmonary embolism or pneumothorax, a recent hospital discharge, or an attending physician who was not an internist, family physician, hospitalist, pulmonologist, or intensivist.

Antibiotic treatment was defined as a minimum of two consecutive days of an antibiotic, initiated on hospital day 1 or 2, including time spent in the emergency department. Antibiotics that were "counted," included first-, second-, and third-generation cephalosporins, quinolones, macrolides, tetracyclines, trimethoprim-sulfamethoxazole, and amoxicillin with or without clavulanic acid. Patients receiving other classes of antibiotics, or who received only a single day of treatment on hospital day 1 or 2, were excluded from the analysis. For the analysis, all antibiotics were considered equivalent, regardless of class, dose, duration, or route of administration. Patients whose antibiotic treatment started later than hospital day 2 were grouped with those who were not treated. The primary outcome was a composite measure of treatment failure, defined as the initiation of mechanical ventilation after hospital day 2, in-hospital mortality, or readmission for COPD within 30 days of discharge. Secondary outcomes included hospital costs and length of stay, as well as allergic reactions, diarrhea, and antibiotic-associated diarrhea, defined as treatment with either metronidazole or oral vancomycin initiated after hospital day 3 or readmission within 30 days for diarrhea and *Clostridium difficile*.

The sample used for the analysis included 84,621 patients whose median age was 69 years; 61% were women and 71% were white. Ninety percent of patients had a principal diagnosis of obstructive chronic bronchitis with acute exacerbation and 10% had respiratory failure. The most common comorbid conditions were hypertension, diabetes mellitus, and congestive heart failure. Twenty-eight percent had been admitted at least once in the preceding 12 months. In-hospital mortality was 1.2%, while 10% of patients experienced the composite measure of treatment failure (initiation of mechanical ventilation after hospital day 2, in-hospital mortality, or readmission for COPD within 30 days of discharge). Mean length of stay was 4.8 days.

Most (79%) patients received at least two consecutive days of antibiotic treatment beginning on day 1 or 2 of hospitalization, usually with a quinolone (60%), a cephalosporin (37%), or a macrolide (38%). Compared with patients not receiving antibiotics in the first two days, antibiotic-treated patients were less likely to receive mechanical ventilation after the second hospital day (1.07% vs. 1.80%), had lower inpatient mortality (1.04% vs. 1.59%), had a lower incidence of treatment failure (9.77% vs. 11.75%), had lower costs, and subsequently had lower rates of readmission for acute exacerbations of COPD (7.91% vs. 8.79%). Although antibiotic-treated patients had somewhat fewer allergic reactions (0.13% vs. 0.20%), they had a higher incidence of readmissions for *C. difficile* diarrhea (0.19% vs. 0.09%). After adjustment for the severity of illness, the beneficial effects of antibiotics were still evident. Buried in the fine print, however, was the revelation that the antibiotic group had higher costs than the non-antibiotic group, after adjustment.

Most hospitals had rates of antibiotic prescribing between 65% and 95%. When individual patients were assigned a probability of initial treatment with antibiotics equal to the hospital rate where they received care, each 10% increase in the hospital rate of treatment (e.g., from 70% to 80%) was associated with a 5% reduction in the odds of treatment failure, and this relationship was strengthened by removing patients with asthma plus COPD with acute exacerbation from the calculation.

There were some differences between those patients whose physicians ordered early antibiotics and those who did not in this nonrandomized trial. Compared with patients who did not receive initial treatment with an antibiotic, treated patients were younger and had fewer comorbidities and prior recent admissions. They were more likely to have private insurance and to be white. They were also more likely to be from hospitals that were smaller, southern, rural, and nonteaching.

In general, those patients who received early antibiotics were more likely to be treated according to published guidelines, including receiving steroids and bronchodilators. They were also, however, more likely to receive some treatments not recommended by guidelines, such as methylxanthine and mucolytic agents and chest physiotherapy. They were less likely to receive loop diuretics, morphine, and non-invasive positive pressure ventilation. The authors determined several factors that increased the propensity for antibiotic use early on; after adjustment for the "propensity score" of antibiotic prescription, those who were prescribed antibiotics early on were still more likely to be white, rural, insured by Medicare, and to have heart failure, diabetes, or renal failure. They also were more likely to receive methylxanthines, bronchodilators, steroids, morphine, and diuretics. They also underwent more diagnostic testing, but the differences were small.

■ **COMMENTARY**

Although its prevalence has begun to fall as tobacco consumption falls, COPD remains prevalent, and is the fourth leading cause of death in the United States.[1] COPD exacerbations drive much of the cost of care for COPD patients, and are responsible for more than 600,000 hospitalizations annually, resulting in direct costs of more than $20 billion.[2] Respiratory infections are probably the most common cause of COPD exacerbation,[3] and several COPD treatment guidelines recommend antibiotic treatment for patients with purulent sputum and either an increase in sputum production or an increase in dyspnea.[2,4,5] As is true for many expert guidelines, these recommendations are largely based on older (albeit randomized) trials. The current report, while retrospective and nonrandomized, comes from a large national sample of hospitals, and assessed outcomes in addition to mortality and respiratory failure. In this sample, fewer than 80% of patients received antibiotics in the first two days of hospitalization, perhaps because current guidelines recommend antibiotics only for patients with purulent or increased sputum production. What is new here is that the results of this analysis do not support restriction of antibiotics to COPD patients (experiencing exacerbation) with purulent sputum, increased sputum production, or dyspnea. The authors conclude that since "… all patient groups seemed to benefit from therapy and that harms were minimal … all patients hospitalized with acute exacerbations of COPD should be prescribed antibiotics." Compared to lots of other things we do for patients who have a very high probability of winding up in the ICU, this does not seem to be such a far-fetched conclusion. ■

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Oral Nutritional Intake among Critically Ill Patients Is Grossly Deficient in the Week Following Extubation

ABSTRACT & COMMENTARY

By David J. Pierson, MD

This article originally appeared in the July 2010 issue of Critical Care Alert. *It was peer reviewed by William Thompson, MD*

Synopsis: *In a prospective study of the actual oral nutritional intake of patients with respiratory failure in the first week following extubation, average intake failed to exceed 50% of daily requirements on all seven days.*

Source: Peterson SJ, et al. Adequacy of oral intake in critically ill patients 1 week after extubation. *J Am Diet Assoc.* 2010;110: 427-433.

Peterson and colleagues at Rush University Medical Center carried out an observational study of ICU patients' oral nutritional intake in the seven days following extubation after mechanical ventilation for acute respiratory failure. They included adult patients who were ventilated for at least 24 hours prior to extubation, were advanced to an oral diet once the endotracheal tube was removed, and were not receiving supplementary enteral or parenteral nutrition. Patients were judged by a standard technique to be either well-nourished or suffering from malnutrition of various degrees of severity. Their estimated daily energy requirements were also determined by accepted techniques based on admission body weight and BMI. The investigators evaluated the adequacy of daily oral intake using a modified multiple-pass 24-hour recall technique, essentially consisting of daily structured interviews of the patient and family in reference to the actual meal menus they had used. Oral intake < 75% of daily requirement — a threshold below which previous studies have shown to be associated with significant loss of body weight during illness — was considered inadequate.

During the study period, 64 patients were eligible and 50 were evaluated after exclusion of 14 because of inability or unwillingness to participate. The patients (54% women) had a mean age of 59 years, were evenly distributed between medical and surgical ICUs, and had mean BMIs of 28.7 kg/m^2 on admission. They had mean admission APACHE II scores of 22 and had been invasively ventilated for 5.2 ± 4.2 days (mean ± SD). Forty-four percent of the population was classified as moderately or severely malnourished via the Subjective Global Assessment technique.

On post-extubation day 1, only eight patients (16%) consumed at least 75% of their daily requirements. On days 2-7,

the proportions were 25%, 26%, 29%, 28%, 5%, and 18%, respectively, of the patients remaining in the study. On day 1, among the majority of patients whose caloric intake was < 75% of requirements, the 24-hour calorie count was 480 ± 282 kcal, with only 22 ± 13 g protein; these values remained roughly the same in the succeeding days. Lack of appetite and the presence of nausea or vomiting were cited most often by patients as reasons for not taking in more nutrition. A substantial proportion of the patients with inadequate oral intake were on therapeutic diets, such as "heart-healthy," diabetic, or renal regimens.

■ COMMENTARY

Malnutrition is very common among hospitalized patients and is associated with high rates of nosocomial infections, increased hospital costs, prolonged lengths of stay, and higher mortality. More and more attention is being paid to the institution of early and appropriate nutritional support when critically ill patients are first admitted to the ICU. However, almost no previous work has examined the adequacy of nutritional support among patients who have been extubated and are in the recovery phase of critical illness. The results of this modestly sized observational study from a single institution are not very encouraging, and suggest that the actual nutrition delivered to most such patients falls way short of ideal — or even adequate. The authors appropriately note that further research is needed in this area. They also call into question the widespread use of restrictive oral diets (such as special renal or diabetic diets, which may be less appealing to patients) in the early days following extubation, and posit that alternative medical nutrition therapies may be needed in this setting. ■

CME Questions

36. In the retrospective, nonrandomized, chart review of more than 84,000 people hospitalized for a COPD exacerbation, Rothberg et al observed that treatment with antibiotics within the first two days of admission led to which of the following outcomes?

a. Lower risk of treatment failure
b. Decreased inpatient mortality
c. Higher incidence of readmission for *C. difficile* diarrhea
d. All of the above

37. According to the retrospective study by Dabbagh et al on patients hospitalized with severe chronic liver disease and divided into quartiles based on the International Normalized Ratio (INR), venous thromboembolism was observed:

a. only in the patients in the quartile with the lowest INR.
b. only in the patients in the quartile with the highest INR.
c. in patients in all four quartiles, regardless of their INR.
d. primarily in patients with Child-Pugh stage A cirrhosis.

38. Based on the recent study by Milonas et al involving more than 100,000 people admitted for myocardial infarction in Sweden, the use of ACE-inhibitor treatment at the time of discharge was associated with which of the following outcomes?

a. A higher rate of renal failure
b. Lower one-year mortality
c. A higher rate of recurrent MI
d. All of the above

Answers: 36. (d); 37. (c); 38. (b)

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. ■