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HOSPITAL MEDICINE ALERT

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INSIDE

Can We Accurately Predict Fluid Responsiveness?

ABSTRACT & COMMENTARY

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

This article originally appeared in the April 2010 issue of Critical Care Alert. *It was edited by David J. Pierson, MD, and peer reviewed by William Thompson, MD. Dr. Pierson is Professor, Pulmonary and Critical Care Medicine, Harborview Medical Center, University of Washington, Seattle, and Dr. Thompson is Staff Pulmonologist, VA Medical Center; Associate Professor of Medicine, University of Washington; they both report no financial relationships relevant to this field of study.*

Synopsis: *This non-randomized, prospective trial demonstrated that passive leg raising can be used to predict fluid responsiveness in non-intubated, spontaneously breathing patients with severe sepsis or acute pancreatitis.*

Source: Préau S, et al. Passive leg raising is predictive of fluid responsiveness in spontaneously breathing patients with severe sepsis or acute pancreatitis. *Crit Care Med*. 2010;38:819-825.

Passive leg raising (PLR), a rapidly reversible maneuver that simulates rapid volume expansion by putting several hundred milliliters of fluid back into the circulation, has been shown to predict fluid responsiveness in mechanically ventilated patients. Préau and colleagues sought to determine whether the same maneuver could be used in spontaneously breathing patients and whether there were any differences between three potential means of assessing the hemodynamic response to the PLR: stroke volume changes measured by echocardiography, pulse pressure variation on arterial pressure monitoring, and Doppler flow measurements in the femoral artery.

The authors enrolled consecutive, non-intubated patients with sepsis or acute pancreatitis at a single center in France. Patients were eligible for participation if the attending physician decided to perform a fluid challenge based on the presence of signs of inad-

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equate tissue perfusion, including hypotension, decreased urine output, mottled skin, or tachycardia. Patients on non-invasive ventilation, or those with poor echocardiographic images or high-grade aortic insufficiency, were excluded. Enrolled patients were placed in the supine position. Systolic, diastolic, and mean arterial pressure (SAP, DAP, MAP), as well as pulse pressure (PP) were measured using an arterial catheter while blood flow velocity in the femoral artery (VF) was assessed with continuous Doppler and stroke volume (SV) was measured with transthoracic echocardiography. The measurements were then repeated within five minutes of raising the patients' legs to 30°-45° relative to the trunk. Following a five-minute period with legs back in the flat position, patients then received a 500 mL infusion of 6% hydroxyethylstarch over < 30 minutes and a final set of measurements was completed. Individuals whose SV rose > 15% following volume expansion (VE) were labeled as responders, while those with < 15% change in SV were labeled non-responders. Changes in each variable in response to PLR were then compared to changes observed following volume expansion. Observed changes were also compared between responders and non-responders.

Of 890 patients admitted to the ICU in the two-year study period, only 34 met inclusion criteria and had suitable echocardiographic windows to permit SV measurements, including 28 patients (82%) with severe sepsis and six (18%) with acute pancreatitis. In the entire group, PLR increased SV from 47 ± 14 to 50 ± 14 mL ($p < 0.01$), while VE increased SV from 47 ± 14 to 53 ± 15 mL. SV positively correlated with PP (r2 = 0.4) and VF (r2 = 0.62). Among the 14 patients (41%) determined to be VE-responders, SV, PP, and VF were significantly higher than in the non-responders, and also showed positive and statistically significant correlations with SV changes seen following VE. A SV greater than or equal to 10% predicted volume responsiveness with a sensitivity of 86% and specificity of 90%, while PP greater than or equal to 9% (sensitivity 79%, specificity 85%) and VF greater than or equal to 8% (sensitivity 86%, specificity 80%) were also found to be useful in this regard.

■ COMMENTARY

Just about every critical care physician has been at the bedside of a hypotensive patient and wondered whether to give fluids or start a vasopressor. A reliable tool for answering this question and predicting volume responsiveness remains one of the "holy grails" of critical care medicine. The clinician can always stand there and give more fluid to see if the patient is volume-responsive but in non-intubated patients this simple strategy may provoke worsening respiratory failure and create a need for intubation that may not have been there otherwise. Central venous pressure measurements are often relied upon to guide decisions, but studies have consistently shown that such static measures of preload are poor predictors of volume responsiveness. In the face of such issues, PLR and other "dynamic" measures have been proposed as an alternative means for guiding these decisions.[1]

At first glance, the technique sounds exceedingly simple. Place the patient in the supine position, raise his/her legs to 30°-45°, during which time about 300-500 mL of fluid reenters the circulation, and observe the response. The devil is in the details, however, as the response to PLR and, therefore the determination of volume responsiveness, is not made by simply looking at whether the patient's blood pressure improves, but rather requires the use of techniques such as echocardiography or esophageal Doppler monitoring to assess the hemodynamic response to the maneuver. These requirements limit the utility of PLR a great deal as clinicians may either lack the skills to do the measurements themselves or may not have access to the tools in the short time they have to make a decision about treating the hypotensive patient.

The study by Préau et al moves PLR a bit closer to being a useful bedside technique because it demonstrates that PP changes on an arterial catheter correlate to a reasonable degree with echocardiographic measurements of the change in SV and, as a result, can be used as a surrogate measure of the hemodynamic response to PLR. However, while the study does move us closer, it does not get us all the way there. The authors only looked at non-intubated patients in their study, a significant limitation when one considers the high percentage of patients with severe sepsis and acute

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pancreatitis who end up on mechanical ventilation. Further study will be needed in these patient groups using a PLR protocol similar to that used by Préau and colleagues before we can rely on this technique to guide our assessments of volume responsiveness. ■

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NT-pro BNP

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 April 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. Dr. Weiss reports no financial relationships relevant to this field of study.*

Sources: deFilippi CR, et al. Dynamic cardiovascular risk assessment in elderly people. *J Am Coll Cardiol*. 2010;55:441-450; Berger R, et al. N-terminal pro-B type natriuretic peptide-guided, intensive patient management in addition to multidisciplinary care in chronic heart failure. *J Am Coll Cardiol*. 2010;55:645-653.

Natriuretic peptide levels (BNP, NT-proBNP) are of prognostic value in general populations, but whether they add information to other known risk factors for cardiovascular outcomes is less clear. Thus, deFilippi et al studied almost 3,000 older adults free of heart failure by measuring NT-proBNP at baseline and then 2-3 years later. The endpoints were new-onset heart failure and cardiovascular death. After adjustment for confounders, they sought an association between initial NT-proBNP and changes in NT-proBNP and the primary endpoints.

Results: The highest quintile of NT-proBNP (> 268 pg/mL) was independently associated with new-onset heart failure (HR = 3.1, 95% CI: 2.5-3.8) and CV death (HR = 3.0, CI: 2.4-3.9), as compared to the lowest quintile (< 48 pg/mL). The cut-point for increased risk was a NT-proBNP level of 190 pg/mL. A change in NT-proBNP > 25% was associated with higher or lower risk, depending on the direction of change, compared to those with unchanged levels. The authors concluded that NT-proBNP levels independently predict new-onset heart failure and CV death in older adults, and that changes over time reflect a change in these risks.

Berger et al investigated whether heart failure patient management using NT-proBNP levels (BM) was superior to multi-disciplinary (MD) or standard management (SM). They randomized 278 hospitalized patients to BM vs. MD vs. SM. MD included consultations from a heart-failure specialist and home care by a heart failure-trained nurse. BM used NT-proBNP levels to aggressively up titrate medications. The endpoints were heart-failure rehospitalization and death. At one year, more of the BM group was on triple therapy (beta blocker, spironolactone, ACEI/ARB) at target doses. BM reduced heart-failure hospitalization days (BM 488, MD1254, SM 1588, $p <$ .001). The combined endpoint of heart-failure rehospitalization and death was lower in the BM group (37%, MD 50%, SM 65%, $p < .05$). Death was similar in BM and MD, 22%, but higher in SM, 39% ($p < 0.02$). The authors concluded that heart-failure management, using NT-proBNP levels to guide therapy, was superior to multi-disciplinary care and standard management for reducing heart-failure recurrence and death.

■ COMMENTARY

These two studies support a role for natriuretic peptide (NP) level measurements in the primary and secondary prevention of heart failure. In the elderly group studied by deFilippi et al, NP levels were independent of age, traditional risk factors, ECG, and echocardiographic measures in predicting heart failure and CV death. This is important information since traditional risk factors and biomarkers are known to be less predictive of outcomes in the elderly (i.e., lipids, CRP). Thus, in patients at high risk for heart failure (post MI, hypertension), NP may signal an opportunity to intensify therapy to prevent heart failure from developing. It would not make sense to test everyone but to focus on those most likely to develop heart failure.

NP levels reflect measure ventricular wall stress, which, when elevated, can lead to heart failure. Although all patients with heart failure should be put on all medications known to improve symptoms and survival, and they should be titrated up to at least the doses used in their respective trials, this does not happen often, as was demonstrated in the standard management group of Berger's trial. Thus, NP levels allow one to focus resources on the highest-risk patients who need this up titration and maximization of medical therapy. Also, maximum therapy can be dangerous in some patients with lower blood pressure and other comorbidities. By focusing on high-risk patients, medicine maximization can be accomplished more safely. Whether BNP would work as well as NT-proBNP is not known, but the principle should be the same. ■

Fusobacterium and Tonsillar Infections

ABSTRACT & COMMENTARY

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This article originally appeared in the April 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, Glaxo-SmithKline, Pfizer, Bayer, and Wyeth, and does research for Merck, and Dr. Jenkins reports no financial relationships relevant to this field of study.*

Synopsis: *In this study, 847 patients with peritonsillar abscess (PTA) admitted to Aarhus University hospitals from 2001-2006 were included in this retrospective study. Fusobacterium necrophorum (FN) was the most frequently detected bacterium (23%) followed by group A streptococci (GAS) (17%) and groups C and G streptococci (GCS/GGS) (5% combined).*

Source: Ehlers T, et al. *Fusobacterium necrophorum*: Most prevalent pathogen in peritonsillar abscess in Denmark. *Clin Infect Dis*. 2009;49:1467-1472.

Eight hundred forty-seven patients with peritonsillar abscess admitted to the ENT service at Aarhus University hospitals from 2001-2006 were included in this retrospective study. Most patients underwent tonsillectomy and/or incision and drainage. Pus aspirates and pus swab samples were cultured for routine and anaerobic cultures using standard microbiological methods.

The median age of patients studied was 21 years. FN alone was isolated from 167 patients, GAS alone from 133, GCS/GGS alone from 23, FN+beta hemolytic strep from 24, other bacteria 58, mixed oral flora from 355, no culture was obtained in 87 patients, and a diagnosis of infectious mononucleosis was made in 26 patients.

Of the 760 patients who had cultures taken, FN was recovered from 44% from those patients with PTA who received antibiotics prior to admission and from 36% of those patients who had not received antibiotics.

■ COMMENTARY

The information in this paper is quite interesting. The increased isolation of FN from patients with PTA in this study vs. the relatively low prevalence of this organism in historical literature may reflect the use of better anaerobic bacteriology in the clinical setting at this institution. Brook et al in an earlier study found other anaerobes (including Prevotella, Porphyromonas, and Peptostreptococcus), as well as Fusobacterium in PTA and parapharyngeal abscesses.[1]

The big concern about FN is its association with Lemierre's syndrome (septic thrombophlebitis of the internal jugular vein following sore throat). Interestingly, the authors of this study of PTA do not comment on whether or not they saw Lemierre's in any of their patients. Late last year there was a somewhat alarming "Perspective" article published in *Annals of Internal Medicine* recommending that we should stop focusing solely on GAS and "expand the pharyngitis paradigm for adolescents and young adults."[2] This recommendation was made by the author based on several case reports of FN causing (or at least being isolated from patients with) pharyngitis. His recommendation to use penicillin derivatives and to avoid macrolides in the treatment of GAS-negative pharyngotonsillitis seemed somewhat illogical since the concern about using macrolides would seem to be related to the increased prevalence of macrolide resistance in GAS. Also, if the recommendation to always use β-lactam agents empirically for the treatment of adolescents with pharyngotonsillitis is to prevent complications of FN infection, the results of the Danish study do not support that since penicillins were administered to 94% of the 293 antibiotic-treated patients with PTA and if anything appeared to increase the risk for isolation of FN.

Despite the frequent isolation of FN from patients undergoing tonsillectomy or incision and drainage for PTA, Lemierre's syndrome fortunately seems to be a rare complication. (I have cared for only three patients with Lemierre's in my 37-year career.) While FN is clearly an important pathogen capable of causing both PTA and Lemierre's syndrome, its overall importance as a cause of all cases of pharyngotonsillitis remains uncertain. In another recently published study, throat swabs were taken from 411 mostly asymptomatic university students and from 103 patients who presented with sore throat.[3] The throat swabs were tested for β-hemolytic streptococci by routine culture, for EBV and *F. necrophorum* DNA by PCR. FN was found in 43/411 (10.5%) of students and this represented asymptomatic carriage in 29/43 (67.4%).

It is difficult to integrate all of these findings into a coherent story. Clearly, FN is a pathogen capable of causing both peritonsillar abscess (commonly) and Lemierre's syndrome (rarely). However, FN is also commonly isolated from the throats of asymptomatic adolescents and young adults. I already generally prescribe antimicrobials for patients with clinically significant tonsillitis whether or

not GAS is present on rapid screen or culture. Due to the common presence of FN in asymptomatic and minimally symptomatic younger patients, I am not convinced that it makes sense to routinely test patients with just pharyngitis/mild tonsillitis for the presence of FN nor should empiric therapy be given for this organism in all cases. ■

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Colistin and Acute Respiratory Failure

ABSTRACT & COMMENTARY

By David J. Pierson, MD

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

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

Synopsis: *Colistin, a 50-year-old polymyxin antibiotic that recently has been reintroduced to treat multidrug-resistant hospital-acquired Acinetobacter or* Pseudomonas pneumonia*, can cause acute neuromuscular weakness and precipitate acute hypercapnic respiratory failure, as illustrated by this case report.*

Source: Wahby K, et al. Intravenous and inhalational colistin-induced respiratory failure. *Clin Infect Dis*. 2010;50:e38-e40.

Wahby and colleagues in Detroit report the case of a 33-year-old woman with *Acinetobacter baumannii* pneumonia complicating a prolonged ICU stay after a peripheral blood stem-cell transplant. The organism was resistant to all antibiotics except ampicillin-sulbactam (in very high concentrations) and colistin. After five days of intravenous colistin at 2.5 mg/kg every 12 hours (in the usual recommended dose range), the patient developed respiratory distress and was found to have severe acute respiratory acidosis, requiring intubation and mechanical ventilation. No other drugs or disease processes likely to have precipitated neuromuscular weakness were identified, and the patient improved within 24 hours after the colistin was switched to ampicillin-sulbactam. Extubated with a normal arterial PCO_2 after five days and transferred to the floor, she was begun on colistin by inhalation, 75 mg nebulized every 12 hours, in addition to the ampicillin-sulbactam. After three days on this regimen, hypercapnia was again noted, although the inhaled colistin was continued. Twenty-four hours later the patient was found unresponsive in severe acute respiratory acidosis, which again resolved after three days of mechanical ventilation after the inhaled colistin was stopped. The patient recovered from her acute illness and the neuromuscular weakness did not recur.

■ COMMENTARY

Colistin (also called polymyxin E) belongs to the polymyxin group of antibiotics, and first became available for clinical use in about 1960. It was given as an intramuscular injection for the treatment of gram-negative infections, but fell out of favor after aminoglycosides became available because of its adverse effects, principally nausea, vomiting, and nephrotoxicity. It later found wider clinical use as topical therapy as part of selective digestive tract decontamination, and in aerosolized form for patients with cystic fibrosis. More recently, a number of centers around the world have used colistin intravenously as a last-line therapy for otherwise pan-resistant ventilator-associated pneumonia (VAP), especially due to Pseudomonas and Acinetobacter species.[1]

An additional adverse effect of polymyxin antibiotics including colistin — one mostly forgotten as use of these agents largely disappeared in the 1970s — is acute neuromuscular weakness precipitating hypercapnic respiratory failure. Lindesmith et al in Denver reported a series of 11 patients with colistin-induced respiratory paralysis and acute hypercapnic respiratory failure.[2] Most of them also had underlying renal abnormalities (apparently absent in the present case) and had received the drug intramuscularly. As in this case, the weakness resolved quickly once the drug was stopped, with a mean duration of ventilatory support of 27.5 hours.

With aerosolized tobramycin used routinely for serious airway infections in patients with cystic fibrosis, and increasing use of nebulized colistin in this population, it should not be surprising that this agent would be tried in the treatment of VAP in non-cystic-fibrosis patients when the causative organism is resistant to other agents. Administration of colistin by aerosol, which is neither FDA-approved for this indication nor supported by data from controlled trials, appears to be occurring more frequently in the last few years.

Although acute neuromuscular paralysis due to aerosolized colistin has not previously been reported, the present case should alert ICU clinicians to its possibility. Colistin toxicity, whether the drug is administered parenterally or by nebulization, should be added to the list of potential causes for neuromuscular weakness in critically ill patients. ■

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STEMI Patients with Multi-vessel Disease — Culprit-vessel PCI vs. Multi-vessel PCI

ABSTRACT & COMMENTARY

By Andrew J. Boyle, MBBS, PhD

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

This article originally appeared in the April 2010 Clinical Cardiology Alert. *It was edited by Michael H, Crawford, MD, and peer reviewed by Ethan Weiss, MD.*

Source: Hannan EL, et al. Culprit vessel percutaneous coronary intervention versus multivessel and staged percutaneous coronary intervention for ST-segment elevation myocardial infarction patients with multivessel disease. *J Am Coll Cardiol Intv* 2010;3:22-31.

Patients presenting with ST-segment elevation myocardial infarction (STEMI) often have co-existing lesions in the non-infarct arteries (i.e., they have multi-vessel disease). These patients present a management dilemma. Should all lesions be addressed with percutaneous coronary intervention (PCI) at the time of presentation, or should only the culprit lesion be treated? If only the culprit lesion is treated, should the other lesions be medically managed or treated with staged multi-vessel PCI? Current ACC/AHA guidelines recommend treatment of the culprit lesion only, at the time of presentation with STEMI in patients who are hemodynamically stable, but multi-vessel PCI is reasonable if there is hemodynamic compromise. However, techniques have evolved over time, and some small, recent studies suggest that PCI performed not just on the culprit vessel, but on all significant lesions, may be a safe and feasible strategy. Hannan et al examined the New York PCI registry to determine the mortality of multi-vessel PCI at the time of presentation vs. culprit vessel-only PCI in STEMI patients with multi-vessel disease. Furthermore, in patients who had culprit vessel-only PCI, they examined the effects on mortality of staged multi-vessel PCI within 60 days vs. ongoing medical management.

Results: After excluding patients with missing ejection fractions (EF), left main disease, prior open-heart surgery, shock, and thrombolysis before PCI, the authors identified 4,024 patients who presented with STEMI and co-existent multi-vessel disease and underwent primary PCI between 2003 and 2006. Of these, the vast majority (87.5%, n = 3,521) underwent PCI of the culprit vessel only, and the remaining 503 (12.5%) underwent multi-vessel PCI at the time of the index procedure. Patients who had multi-vessel PCI were younger ($p = 0.001$), more likely to have low or high EF ($p = 0.01$), less likely to have chronic occlusion ($p < 0.0001$), less likely to have TIMI flow grade less than or equal to two in the culprit vessel before PCI ($p = 0.0004$), and more likely to have had bare-metal stents (BMS, $p < 0.001$). To compare the groups more equally, the authors performed propensity matching using clinical and anatomical factors, and identified 503 matched pairs. Overall, there was a trend toward lower mortality in the culprit-only PCI group, but this failed to reach statistical significance. When patients with hemodynamic instability, EF < 20%, and malignant ventricular arrhythmias were excluded, in-hospital mortality was significantly lower in the culprit-vessel PCI group (0.9% vs. 2.4%, $p = 0.04$). This trend continued at 12, 24, and 42 months.

The authors then identified patients who had received culprit vessel-only PCI at the time of the index procedure, but had received staged PCI of the other lesions, either in-hospital (n = 259) or within 60 days (n = 538). To determine the effects of staged PCI on mortality outcomes, the authors propensity-matched these patients undergoing staged multi-vessel PCI against those undergoing culprit-only PCI without further revascularization. Staged PCI during the index hospitalization had no significant effect on mortality, although those with staged PCI had a trend toward lower rates at all time-points. The authors then compared the mortality of patients who had staged multi-vessel PCI within 60 days of the index admission and those who had culprit-vessel PCI only but remained alive at 60 days. Staged multi-vessel PCI resulted in lower 12-month mortality (1.3% vs. 2.2%; $p = 0.04$), and this trend continued out to 42 months. The authors conclude that their findings support the ACC/AHA recommendation that culprit vessel-only PCI should be used for STEMI patients at the time of index procedure in patients who are not hemodynamically compromised. However, staged PCI within 60 days after the index admission is associated with risk-adjusted mortality rates that are comparable with the rate for culprit-vessel PCI alone.

■ COMMENTARY

The findings of this study support current practice guidelines and steer clinicians away from performing multi-vessel PCI during the index procedure in hemodynamically stable patients with STEMI. Several limitations to this study must be acknowledged in interpreting the slight improvements in mortality. Firstly, this is a retrospective, observational study, not a prospective,

randomized trial. Hannan et al used complex statistical models to try to account for unmeasured confounders, but the ability to draw firm conclusions from their study is limited. Secondly, there are several omissions from the dataset that could influence the primary outcome, such as the use on glycoprotein IIb/IIIa inhibitors, clopidogrel dose, timing and duration, discharge medications such as beta-blocker usage, and how many patients underwent coronary artery bypass graft surgery. Thirdly, the death statistics are taken from a state database and, thus, patients who died out of state may not have been included. Despite these limitations, several important issues are addressed here. In stable patients, there is clearly no benefit in performing multi-vessel PCI at the time of the index procedure. We use many intangible and immeasurable factors in decision making about revascularization choices. Hannan et al show us that operator discretion-based decisions to perform multi-vessel PCI at the time of primary PCI for STEMI do not decrease mortality, and may even increase it; staged PCI seems to be a better option. This study does not tell us whether staged PCI was performed based on ischemia or symptoms, or simply to achieve complete revascularization, nor are we told about other outcomes, such as quality of life, subsequent revascularization, etc. However, staged PCI appears safe, and may lead to slight improvement. ■

Infection in HIV Patients

ABSTRACT & COMMENTARY

By Dean L. Winslow, MD, FACP, FIDSA

This article originally appeared in the April 2010 issue of Infectious Disease Alert. *It was edited by Stan Deresinski, MD, FACP, and peer reviewed by Timothy Jenkins, MD. .*

Synopsis: *In a prospective surveillance study, 50 HIV-positive patients who presented with febrile respiratory symptoms were evaluated for the presence of respiratory viruses by multiplex RT-PCR and a microarray assay and for atypical bacterial pathogens by PCR, in addition to sputum cultures and serologic testing. Viruses accounted for 64% of the infections. Influenza virus was identified in 22 cases, and human metapneumovirus (hMPV) was next most common, with six cases.*

Source: Klein MB, et al. Viral pathogens including human metapneumovirus are the primary cause of febrile respiratory illness in HIV-infected adults receiving antiretroviral therapy. *J Infect Dis*. 2010;201:297-301.

Fifty consecutive patients from a large HIV clinic in Montreal, who presented with febrile respiratory symptoms (temperature > 38° C and one or more respiratory symptom) from November 2003-April 2006, were recruited for this prospective study. An in-house multiplex real-time PCR assay was originally used to test NP samples for influenza A and B, RSV, and hMPV. Frozen aliquots of the original samples were later tested for adenovirus groups A, B, C, and E; rhinovirus A and B; influenza A and B; hMPV A and B; RSV A and B; parainfluenza types 1-3; coronaviruses HKU1, 229E, NL63, and OC43; and enteroviruses A-D using a commercial microarray assay. Paired acute and convalescent sera were analyzed by complement fixation. NP samples were tested for rRNA genes of *M. pneumoniae*, *C. pneumoniae*, and *L. pneumophila*. From all individuals with productive cough, a sputum sample was sent for bacterial culture and sensitivity.

Twenty-two patients were found to be infected with influenza virus, 12 with noninfluenza viral pathogens, six had bacterial infections, and 16 were not diagnosed. Patients with influenza had a median CD4+ lymphocyte count of 280, and those with noninfluenza viral infections had a median CD4+ count of 484. In addition to fever and myalgias, the patients with hMPV infection had predominant lower respiratory tract symptoms, with cough, dyspnea, and wheezing in most cases. Only one of the hMPV cases was complicated by documented bacterial infection (bacteremic pneumococcal disease). While the hMPV patients were less immunosuppressed than the influenza patients, almost all had underlying asthma.

■ COMMENTARY

This study, while small, highlights the potential importance of hMPV as a cause of febrile respiratory symptoms in adult patients with HIV. While some obvious caveats to the generalizability of the findings in this study apply (e.g., hMPV may or may not cause this high proportion of febrile respiratory infections in all years and in all areas of North America), the association of hMPV with prominent lower respiratory signs and symptoms, and association with underlying asthma, is notable. The authors note that despite the fact that only one hMPV-infected patient had documented bacterial superinfection, > 80% received antibiotics despite normal chest X-rays. The promise of rapid, sensitive, molecular diagnostic assays for viral pathogens in clinical use would seem to have the potential to reduce unnecessary prescription of antibiotics. However, the costs of these assays and the turn-around times need to be markedly reduced in order for this to become a reality. ■

CME Questions

4. In the prospective case series of HIV patients presenting with a febrile respiratory illness, Klein et al found that the most common causative agent(s) was/were:

a. *Pneumocystis jirovecii* (PJP or PCP).

b. *Streptococcus pneumoniae.*

c. *Chlamydia pneumoniae.*

d. viruses.

5. According to the study by Préau et al, the best predictor of a response to a fluids in patients with sepsis is:

a. orthostatic changes in heart rate.

b. central venous pressure.

c. pulmonary capillary wedge pressure.

d. None of the above

6. Based on the recent report by Hannan et al of a series of patients with STEMI and multivessel disease, percutaneous coronary intervention (PCI) should:

a. be limited to the culprit vessel.

b. include all diseased vessels.

c. be delayed in favor of medical therapy.

d. be avoided in favor of surgical therapy (CABG).

Answers: 4. (d); 5. (d); 6. (a)

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. ■

Health Care Reform Update

What Health Care Reform Means to You A supplement to *Hospital Medicine Alert*

Increased provider access tops list of what clinicians will like about HC bill

Changes will take a few years

HEALTH CARE CLINICIANS AND ORGANIZATIONS LIKELY will find that the new health care reform bill's positive features outweigh its drawbacks, experts say.

The Patient Protection and Affordable Health Care Act, signed into law on March 23, 2010, by President Barack Obama, provides a series of changes to take place to health care insurance coverage, Medicare, Medicaid, prescription drugs, quality improvement initiatives, medical malpractice, and other items. These are to be implemented from 2010 to 2014.

"The thing that is so big is the coverage for tens of millions of people who don't have health insurance now," says **Cecil Wilson**, MD, an internist in Winter Park, FL, and the president-elect of the American Medical Association in Chicago, IL.

People no longer will have to worry about losing health care coverage for existing diseases if they lose their jobs, and increasing numbers of people will have access to preventive care, primary care, and disease management, Wilson adds.

"Those are the big things that make this such a sea change in my opinion," he says. "For physicians, this is good because they won't have to worry about their patients' insurance being cut off, and thus putting their patients at risk."

Hospitals will find that significantly more patients will have health care coverage, resulting in a decline in uncompensated care, says **Caroline Steinberg**, vice president for trends analysis for the American Hospital Association in Washington, DC.

"We also would expect that demand for care from formerly uninsured patients will increase," Steinberg says. "Hopefully, we'll see some increases in primary care so by the time they hit the hospital they won't have some of the same kinds of problems they've had before."

The new bill provides billions of dollars in funding for clinics that provide primary care to uninsured, indigent, and immigrant patients. In 2014, it also expands Medicaid to all non-Medicare eligible individuals who have incomes up to 133% of the federal poverty level. These initiatives could help send more people to primary care services and keep them from using the emergency room for non-emergency care, Steinberg adds.

"We may [identify] more people with conditions that require specialty care because once people have access to coverage they tend to use more health care across all levels of the system," Steinberg says. "So that could go either way."

Plus, hospitals should expect the next few years to continue to be rough fiscally since most of the more significant provisions in the bill will not be fully implemented until 2014.

"Our hospitals are telling us that uncompensated care is going up because of job losses and loss of insurance, and these people show up in hospitals," Steinberg says.

There won't be much improvement in the immediate future until the economy recovers and the government provides more funding for Medicaid, she notes.

More oncology patients will have access to care, as a result of the bill's prohibition of lifetime limits on the dollar value of coverage, which begins Jan. 1, 2014. There is a temporary national high-risk pool to provide health care coverage to people with pre-existing medical conditions, which will be in place between June 2010 and 2014.

"Many cancer patients who need repeated courses of treatment can easily exceed their caps and find themselves unable to afford needed treatment and medication," says **Allen S. Lichter**, MD, chief executive officer of the American Society of Clinical Oncology (ASCO), in a statement issued after the bill was signed.

By this fall, insurers will not be able to exclude children with pre-existing conditions from being covered by their family policy, and this also is a positive move, Lichter says.

The bill's focus on prevention and wellness will benefit infectious disease and public health initiatives.

"There are a few things in the bill that we're pleased to see stay in the final version," says **Michael Ochs**, government relations associate with the Infectious Diseases Society of America (IDSA) in Arlington, VA.

The bill's emphasis on wellness and disease prevention with billions of additional federal dollars for these is one example, Ochs says.

The bill's impact on physician and other provider payments is a more mixed bag, however. *(See story on*

physician payments, below.)

"There's a 10% incentive pay for primary care and general surgery," says **Jason A. Scull**, program officer for clinical affairs at IDSA.

"They're focusing on primary care in a lot of these new innovative payment models, but I think primary care does need to be incentivized," Scull says.

But the drawback is that cognitive specialists, like infectious disease specialists, cardiologists, and neurologists, could be shortchanged as the pie is cut differently, but not expanded.

"There will be unintended consequences," Scull notes. "Already last year the Centers for Medicare & Medicaid Services eliminated payments for consultation codes that cognitive specialties use to give them money to distribute elsewhere in the fee schedule and to send more to primary care physicians."

This redistribution of payments might result in fewer medical students choosing to spend extra years of training beyond their general internal medicine residency, he adds.

While the sweeping health care reform provides some specifics on how changes will occur in the industry, no one knows precisely how things will change until the regulatory details emerge, the experts say.

"There are a lot of moving pieces to this," Scull says. "I think it's anybody's guess to where all of this ends up." ■

Doctors will be more closely scrutinized with bill's provisions

Experts talk about bill's negatives

PAY ATTENTION TO THE NEW HEALTH CARE BILL'S REGulatory details, experts warn providers.

There are some items in the sweeping legislation that could result in more documentation, work, and risk for physicians and other providers.

For instance, the new bill makes it clear that the government wants doctors to be doctors and not own hospitals, says **LaDale K. George**, JD, a partner with Neal, Gerber, Eisenberg in Chicago, IL.

The bill puts a moratorium on any physician-owned hospitals in non-rural settings that were not Medicare providers as of December 2010.

"The new law says that the practice of physicians owning hospitals no longer is allowed," he explains. "If a physician owns or has a financial interest in a hospital and refers patients to that hospital, then every service the patient receives at the hospital is a Stark violation of $25,000 per incident."

Also, the anti-kickback law has been changed by the new bill.

"The way the new act changes it is that it appears to eliminate the need to have actual knowledge or specific intent to violate the statute," George says. "It moves in the direction of where the Stark law is where if you do not meet the safe harbors in which providers can refer to one another and engage in commercial practices together then you will be viewed as being guilty."

From physicians' perspectives, some of the other requirements will be more onerous, particularly as far as documentation and accounting are concerned.

For instance, the bill's Physician Payment Sunshine Provision requires physicians to disclose every payment they receive from pharmaceutical and biotech companies in excess of $100, and this includes drug samples. This could prove to be an accounting problem for physician investigators and others.

This likely will be a headache to physicians, who will have to keep track of every sample they receive and every payment that flows through to them for research, George says.

The new health care bill also appears to give physicians incentives and/or penalties depending on their compliance with reporting data as part of the physician quality reporting initiative (PQRI), which was established with the 2006 Tax Relief and Health Care Act.

"What's clear is that Congress is moving into the direction of mandating physicians to participate in PQRI and also moving in the direction of mandating physician resource use reporting," says **Jason A. Scull**, program officer for clinical affairs at the Infectious Diseases Society of America.

"These are somehow merged into a value modifier that also will adjust payment based on the quality of care they provide," Scull says.

About one of six eligible physicians now makes the reports, and about half of these receive incentive payments, he adds. ■