AHC Media

Vol. 22, Issue 3, June 2014
www.ahcmedia.com

Critical Care [ALERT]

Authoritative, evidence-based summaries for the critical care clinician

ABSTRACT & COMMENTARY

Ventilator-Associated Events (VAE): An Attempt to Step Out of the Mire

By Richard H. Kallet, MS, RRT, FAARC, FCCM
Director of Quality Assurance, Respiratory Care Services, San Francisco General Hospital
Mr. Kallet reports no financial relationships relevant to this field of study.

SYNOPSIS: Hospital-based infection surveillance experts nationwide participated in a survey to access the level of agreement in diagnosing ventilator-associated pneumonia by evaluating six identical case studies. The level of agreement between participants was poor.

SOURCE: Stevens JP, et al. When policy gets it right: Variability in U.S. hospitals' diagnosis of ventilator-associated pneumonia. *Crit Care Med* 2014; 42:497-503.

The objective of this study was to confirm or disconfirm the perception that subjectivity in the National Health Safety Network's (NHSN) surveillance definition for ventilator-associated pneumonia (VAP) has rendered such data meaningless and unsuitable for use as a quality measure of hospital performance. Investigators constructed six hypothetical cases and asked participants to judge the likely presence of VAP. Forty-three infection specialists representing a cross-section of U.S. hospitals participated. Most participants were either directors of infection control (23%) or infection preventionists (66%). Virtually all (98%) participants used the NHSN surveillance definition for VAP.

Overall, there was poor agreement among participants, with a Fleiss K score of 0.13 (K scores < 0.40 represent poor agreement, and values < 0 signify no agreement). Even in the two vignettes intended to represent "VAP" and "Not-VAP" unambiguously, the K score was only 0.25. Neither the educational background nor job position was associated with the respondents'

Financial Disclosure: *Critical Care Alert*'s editor, David J. Pierson, MD, nurse planner Leslie A. Hoffman, PhD, RN, peer reviewer William Thompson, MD, executive editor Leslie Coplin, and managing editor Neill Kimball report no financial relationships relevant to this field of study.

Critical Care [ALERT]

Critical Care Alert,
ISSN 1067-9502, is published monthly by AHC Media LLC,
One Atlanta Plaza
950 East Paces Ferry Road NE
Suite 2850
Atlanta, GA 30326.

POSTMASTER: Send address changes to Critical Care Alert,
P.O. Box 550669,
Atlanta, GA 30355.

SUBSCRIBER INFORMATION
1-800-688-2421
customerservice@ahcmedia.com
Editorial E-Mail:
neill.kimball@ahcmedia.com

Subscription Prices
United States
Print: 1 year with free AMA Category 1 credits: $349
Add $19.99 for shipping & handling.
Online only, single user: 1 year with free AMA Category 1 credits: $299

Multiple Copies: Discounts are available for group subscriptions, multiple copies, site-licenses or electronic distribution. For pricing information, call Tria Kreutzer at 404-262-5482. 1-9 additional copies: $215 each; 10 or more copies: $191 each.

Back issues: $40 Missing issues will be fulfilled by customer service free of charge when contacted within one month of the missing issue's date.

Canada: Add GST and $30 shipping. Elsewhere: Add $30 shipping.

GST Registration Number: R128870672. Periodicals Postage Paid at Atlanta, GA, 30304 and at additional mailing offices.

ACCREDITATION
AHC Media is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

AHC Media designates this enduring material for a maximum of 2 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

AHC Media is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation. This activity has been approved for 1 nursing contact hour using a 60-minute contact hour. Provider approved by the California Board of Registered Nursing, Provider #14749, for 13.5 Contact Hours. This CME activity is intended for critical care physicians and nurses. It is in effect for 36 months from the date of the publication.

judgments. However, the frequency of VAP determination was significantly lower among respondents who worked in suburban hospitals (31%) compared to those working in an urban (42%) or rural (67%) setting. It appeared that the interpretation of chest radiographs was a particularly important factor in the participants' determinations.

■ COMMENTARY

Concluding that a patient has VAP has always been problematic because a gold standard for diagnosis does not exist. Clinical criteria used to diagnose VAP are based on nonspecific signs common to many other conditions, and some of them are highly subjective. Approximately 60% of clinically diagnosed VAP cases cannot be confirmed by microbiologic cultures.[1]

When surveillance data for VAP are compared, the incidence in Europe (using virtually the same preventive measures) is five times higher than that in the United States.[2] The lower U.S. surveillance rates are widely suspected to be driven by public reporting requirements of infectious complications during hospitalization. Public reporting reflects growing socioeconomic pressures to reign in health care costs, which also entails shifting financial incentives to reward "performance" and punish "preventable complications." Recently, Medicare and Medicaid have considered not reimbursing care related to VAP, while the Joint Commission has contemplated incorporating VAP rates as a factor in rating and accreditation.

Unsurprisingly, more than 50% of non-academic medical ICUs now report VAP rates of zero. This has been widely attributed to the adoption of the "ventilator bundle." Such extraordinarily low VAP rates have been met with pervasive skepticism and insinuations that hospitals are "gaming the system." Understandably, there is enormous pressure on infection surveillance experts to interpret clinical evidence as conservatively as possible. Likewise, government bureaucrats and hospital administrators (with different motivations) may harbor unrealistic expectations on the effectiveness to the VAP bundle.

The VAP bundle represents a credible strategy to reduce modifiable risk factors. Its components are simple, add little if any cost, and are easy to implement. However, the belief that these bundles can achieve a zero VAP rate is highly improbable. Even the most compelling components have limited efficacy in randomized clinical trials (e.g., chlorhexidine reduces VAP by an average of 40%, and the optional use of subglottic drainage tubes reduces VAP by 50%). In the seminal observational study, 95% adherence to the bundle was needed to achieve a 59% decrease in VAP rate.[3] In contrast, there are considerable, non-modifiable factors that increase the propensity for developing VAP (e.g., trauma, neurologic injury, chronic disease) by a factor of 3- to 10-fold. Therefore, hospitals treating primarily high-risk patients could conceivably be exposed to considerable economic liability. It is also not believable that prevention measures, no matter how well executed, could eliminate VAP in these high-risk patient populations.

The study by Stevens and colleagues demonstrates the unsuitability of current VAP surveillance data for benchmarking hospital performance. By comparison, the new surveillance model of ventilator-associated events (VAE)[4] that will be used in the future for public reporting and benchmarking is objective and less prone to manipulation. VAE will bring its own set of problems. But, if evaluating quality of care more objectively brings us closer to extricating ourselves from the current mire, it will be welcomed. ■

REFERENCES

1. Chastre J, Fagon JY. Ventilator-associated pneumonia. *Am J Respir Crit Care Med* 2002;165: 867-903.
2. Klompas M. What can we learn from

international ventilator-associated pneumonia rates? *Crit Care Med* 2012;40:3303-3304.

3. Resar R, et al. Using a bundle approach to improve ventilator care processes and reduce ventilator-associated pneumonia. *Jt Comm J Qual Patient Saf* 2005;31:243-248.

4. Magill SS, et al. Developing a new, national approach to surveillance for ventilator-associated events: Executive summary. *Respir Care* 2013;58:1985-1989.

ABSTRACT & COMMENTARY

Gloves Are Not Perfect

By Eric C. Walter, MD, MSc

Pulmonary and Critical Care Medicine, Northwest Permanente and Kaiser Sunnyside Medical Center, Portland

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

SYNOPSIS: After caring for patients with *Clostridium difficile* infection, nearly 25% of health care workers were found to have hand contamination with *C. difficile* spores.

SOURCE: Landelle C, et al. Contamination of healthcare workers' hands with *Clostridium difficile* spores after caring for patients with *C. difficile* infection. *Infect Control Hosp Epidemiol* 2014;35:10-15.

Clostridium difficile is a prominent pathogen in intensive care units (ICUs) and frequently leads to nosocomial infections. One of the most common modes of transmission of *C. difficile* is via the hands of health care workers (HCWs). In this study, Landelle and colleagues aimed to determine how often HCWs' hands became contaminated with *C. difficile* after caring for patients with *C. difficile* infection (CDI). They also identified risk factors for hand contamination.

In this prospective study, HCWs caring for patients with and without CDI were observed daily over an 8-week period. Patients were located in the ICU and medical and surgical hospital wards. Over the course of the study, HCWs caring for seven patients with CDI and 16 control patients without CDI were observed. Observations included patient contact time, level of risk of patient contact (high risk was defined by the possibility of HCWs' hands to be highly contaminated with fecal material), use of gloves, hand hygiene compliance, etc. All patients with CDI were placed in contact precautions. For HCWs, these precautions included the use of dedicated equipment, donning a disposable gown with full-length sleeves and gloves prior to entering the room, hand hygiene with an alcohol-based solution before wearing gloves, and hand hygiene with soap and water followed by alcohol-based solution after glove removal. HCWs' hands were sampled for *C. difficile* spores immediately after caring for patients, following glove removal, but before hand washing.

Amazingly, and also disturbing, *C. difficile* spores were found on the hands of nearly one out of every four HCWs who had cared for patients with CDI (16/66, 24%). *C. difficile* spores were not isolated from any HCWs caring for patients without CDI (0/44). Having more patient contacts or more contacts with a patient's environment was associated with a higher risk of hand contamination. The number and length of high-risk contacts as well as lack of glove use were also risk factors for hand contamination. After controlling for multiple risk factors using logistic regression, high-risk contact (odds ratio per 1 contact increment, 2.78; 95% CI, 1.42-5.45; P = 0.003) and at least 1 contact without the use of gloves (odds ratio 6.26; 95% CI 1.27-30.78; P = 0.02) was associated with hand contamination.

■ COMMENTARY

In this study, Landelle and colleagues report a distressingly high proportion of HCWs found to have hand contamination with *C. difficile*. Remember this study the next time you go to shake the hand of a colleague caring for a patient with CDI. Even more worrisome, 24% may be a low estimate of the proportion of HCWs with hand contamination. In this study, all HCWs knew they were being observed. Despite knowing this, 7.8% of contacts occurred without the use of gloves. In unobserved settings, the lack of glove use is likely to be higher. Despite only 7.8% of contacts occurring without gloves, 24% of HCWs had contaminated hands. Some contamination can be explained by the lack of glove use but 56% of the HCWs with contaminated hands used gloves for all patient contacts. Gloves are not perfect.

There are some limitations to this study. The number of HCWs observed caring for patients with CDI was adequate but not large (n = 66)

and there were only seven patients with CDI during the study. HCWs' hands were not sampled for *C. difficile* spores prior to entering patient rooms, so it is possible that contamination was present prior to caring for patients with CDI. However, no spores were identified on the hands of HCWs caring for patients without CDI. It is presumed that hand contamination with spores is a risk for transmission of *C. difficile* but the degree of risk is not known, and this study does not address this question.

In summary, this study offers strong evidence that HCWs' hands become contaminated with *C. difficile* spores during patient care and that glove use and contact precautions decrease the risk of contamination but are not perfect. The implied importance of washing your hands vigorously with soap and water after glove removal should not need repeating. ■

ABSTRACT & COMMENTARY

Patients with Multiple Medical Emergency Team Calls Are at High Risk for Adverse Outcomes

By David J. Pierson, MD, Editor

SYNOPSIS: In this large observational study in four hospitals with a standardized rapid response system, among patients with an initial team activation who were not immediately transferred to the ICU, those with one or more additional activations during the hospitalization were more likely to need ICU care and had both longer hospital stays and higher mortality.

SOURCE: Stelfox HT, et al. Characteristics and outcomes for hospitalized patients with recurrent clinical deterioration and repeat medical emergency team activation. *Crit Care Med* 2014; Mar 25. [Epub ahead of print.]

This retrospective cohort study was carried out at four institutions in Alberta — two tertiary care hospitals and two community hospitals — in which each hospital's rapid response system (RRS) for ward patients was activated according to criteria standardized for the province's health care system,[1] with data on all such activations recorded prospectively. A medical emergency team (MET) consisting of an intensivist (attending or fellow, or physician extender), a nurse, and a respiratory therapist responded to all activations, which were triggered by criteria-based changes in vital signs or mental status, or if the ward provider was worried about the patient. By policy, during such "emergency second opinions" a decision is made regarding ICU admission within 30 minutes. The investigators examined all MET records for the four hospitals from 2007 through 2009, focusing on patients whose initial MET call did not trigger an ICU admission, and compared those with only an initial such call to those who had one or more subsequent calls. The study's primary outcome was the need for admission to the ICU following the initial MET call; secondary outcomes were health care resource utilization, ICU and hospital lengths of stay, and in-hospital mortality among patients.

During the 3-year study period, 5008 patients experienced clinical deterioration and MET activation, of whom 26% were admitted to the ICU, 3% died during the consultation, and 7% had the goals of care changed to exclude ICU admission during the initial MET call. Of the remaining 3200 patients, 337 (10.5%) had one or more subsequent MET calls. Compared to patients who had only a single MET call, more of those with multiple calls had chronic liver disease (odds ratio [OR], 1.75; 95% confidence interval [CI], 1.14-2.69), but they were otherwise indistinguishable demographically. Patients with multiple MET calls were more likely to require subsequent ICU admission (43% vs 13%; OR, 6.11; 95% CI, 4.67-8.00; $P < 0.01$), to have longer hospital lengths of stay (median, 31 vs 13 days; $P < 0.01$), and to die during the hospitalization (34% vs 23%; OR, 1.98; 95% CI, 1.47-2.67; $P < 0.01$). During the initial MET call, patients who received airway suctioning, noninvasive ventilation, or placement of a central IV line were more likely to experience subsequent deterioration and MET activation.

■ COMMENTARY

While some controversy continues about the

benefits of RRSs, their optimal structure and functioning, and their necessity for improved outcomes among acutely hospitalized patients, such systems have been widely implemented in North America. This study, carried out by an experienced group of investigators in the context of a standardized RRS employed throughout a provincial healthcare system,[1] is helpful whatever the ultimate verdict on the RRS concept turns out to be. It shows that the need for a second MET call during a given hospitalization — a common occurrence — appears to identify a patient as at greater risk for adverse outcomes as compared to patients whose initial call does not result in ICU admission and who do not trigger a second call.

Further, patients whose initial MET activation includes airway suctioning, the initiation of noninvasive ventilatory support, and/or placement of a central line may be at increased likelihood of subsequently triggering one or more additional MET calls. As Stelfox and colleagues suggest, it may be possible to identify patients at increased risk of recurrent clinical deterioration once a MET activation has occurred. This information may be helpful even in the absence of proof that interventions based on these observational findings can ameliorate the adverse consequences of such risk. ■

REFERENCE

1. Stelfox HT, et al. Intensive care unit bed availability and outcomes for hospitalized patients with sudden deterioration. *Arch Intern Med* 2012;172:467-474.

ABSTRACT & COMMENTARY

Frailty: An Important Determinant of Outcome in Critical Illness

By David J. Pierson, MD, Editor

SYNOPSIS: In this prospective study of older ICU patients (mean age, 67 years), frailty as assessed by a simple scale was present in one-third and was strongly associated with increased risk of adverse events, morbidity, and mortality.

SOURCE: Bagshaw SM, et al. Association between frailty and short- and long-term outcomes among critically ill patients: A multicentre prospective cohort study. *CMAJ* 2014;186:E95-102.

Frailty is an age-associated loss of reserve across multiple physiologic and cognitive systems that leads to increased susceptibility to adverse events. This prospective cohort study carried out in six hospitals in Alberta evaluated all patients aged ≥ 50 years who were admitted to an ICU during an 18-month period for the presence of frailty using a simple, validated scale. The purpose was to determine the prevalence, correlates, and outcomes associated with frailty in this population. With informed consent, patients were enrolled if they were expected to remain in the ICU for at least 24 hours and had not previously participated in the study. Patients were considered to be frail if they had a score > 4 on the Clinical Frailty Scale[1] (*see Table*), as of just prior to hospitalization.

Of 1359 potentially eligible patients during the study period, 421 were enrolled, all of whom were assessed during the hospitalization and at 6 and 12 months. Their mean age was 67 ± 10 years, 39% were female, and 95% were living at home (independently or with assistance) prior to admission. One hundred thirty-eight patients (32.8%) met the frailty criteria and 283 were not frail. Compared to non-frail patients, frail patients were older, more likely to be female, had more comorbid disease and greater functional dependence, and tended to have fewer social supports.

Mortality in the ICU did not differ according to frailty, but frail patients had higher in-hospital mortality (32% vs 16%; odds ratio [OR], 1.81; 95% CI, 1.09-3.01). With multivariable analysis controlling for age, sex, comorbidities, APACHE II score, and Sequential Organ Failure Assessment (SOFA) score during the 12-month follow-up period, frailty was independently associated with all-cause mortality (48% vs 25%; hazard ratio, 1.82; 95% CI, 1.28-2.60). When the absolute frailty score was used rather than the 4-point cutoff, an increasing frailty score was independently associated with incremental mortality. Surviving patients who were frail were less likely to be living independently at home (22% vs 44%; OR, 0.35; 95% CI, 0.20-0.61), a

Table. Clinical Frailty Scale*		
Frailty Score	Category	Description
1	Very fit	Robust, active, energetic, motivated; commonly exercise regularly; among the fittest individuals for their age
2	Well	No active disease symptoms but less fit than in category 1; exercise or are very active only occasionally (e.g., seasonally)
3	Managing well	Medical problems well controlled, but not regularly active beyond routine walking
4	Vulnerable	Not dependent on others for daily help but symptoms often limit activities; frequently "slowed up" or tired during the day
5	Mildly frail	More evident slowing, needing help in high-order activities of daily living such as finances, transportation, heavy housework, and medications; somewhat impaired with respect to shopping, walking outside alone, meal preparation, and housework
6	Moderately frail	Need help with all outside activities and with housekeeping; often have trouble with stairs and need help with bathing; might need minimal assistance (cuing, standby) with dressing
7	Severely frail	Completely dependent for personal care, from whatever cause (physical or cognitive), but seem stable and not at high risk of dying (for example, within 6 months)
8	Very severely frail	Completely dependent, approaching the end of life; recovery from even a relatively minor illness unlikely
9	Terminally ill	Approaching the end of life; category also applies to persons with life expectancy < 6 months but not otherwise evidently frail
*from Rockwood K, et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ* 2005;173:489-495.		

difference that persisted through the 12-month follow-up. Health-related quality of life at 6 and 12 months was generally lower in all domains among patients who were frail, although both groups had lower scores than expected for the general population of the province.

■ COMMENTARY

Frailty is an aspect of health status that has received little attention in critical care. However, it is easy to assess on ICU admission (*see Table*), and this well-done study shows that it is strongly associated with morbidity and mortality — independently of age, comorbidities, and other variables commonly used in evaluating prognosis. As the authors point out, "the interplay of frailty and critical illness may provide an opportunity to target and evaluate interdisciplinary programs of care and rehabilitation, with the aim of improving recovery and avoiding mortality, functional dependence, reduced quality of life and added health service utilization." Aspects of critical care such as minimization of sedation, screening for delirium, nutritional support, early assessment for ventilator weaning, aggressive mobilization, and other areas currently receiving increased attention may be especially important in patients who are frail. Routine detection of frailty when present on ICU admission, and its inclusion in care-related decision-making for patients and their families, may facilitate the setting of goals of care and other aspects of management. ■

REFERENCE

1. Rockwood K, et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ* 2005;173:489-495.

Digital Supplements Available Online

The June 2014 issues of *Pharmacology Watch* and *Clinical Briefs in Primary Care* are now available exclusively by e-mail or online. You can access these two valuable supplements to *Critical Care Alert* at http://www.ahcmedia.com/supplements/. We will send PDF copies of these supplements to you by e-mail if you prefer. Please send an e-mail with your name and/or subscriber number to customerservice@ahcmedia.com with Digital AHC Supplements in the subject line. We welcome your feedback and appreciate your continued support as a subscriber to *Critical Care Alert*. ■

ABSTRACT & COMMENTARY

Sedative Medications: Challenging to Predict Clinical Effectiveness in Some Mechanically Ventilated Patients

By Linda L. Chlan, RN, PhD, FAAN

Dean's Distinguished Professor of Symptom Management Research, The Ohio State University, College of Nursing

Dr. Chlan reports that she receives grant/research support from Hospira.

SYNOPSIS: This pilot study reports that dexmedetomidine might be the sedative of choice for less ill mechanically ventilated ICU patients who take antidepressant medications at home.

SOURCE: Smithburger PL, et al. Patient predictors of dexmedetomidine effectiveness for sedation in intensive care units. *Am J Crit Care* 2014;23: 160-165.

Administration of sedative therapy is a mainstay in today's ICU care of critically ill patients receiving mechanical ventilatory support. Promoting adequate ventilation and gas exchange while managing distressful symptoms such as pain and anxiety experienced by patients remains a vexing clinical challenge. Clinical practice guidelines suggest that the "ideal" patient be comfortable, alert, and only lightly sedated. One medication that might meet this guideline is dexmedetomidine. This agent is classified as a selective alpha-2 adrenergic receptor agonist which is desirable for its light sedative properties that does not induce respiratory depression. The available literature is unclear on the appropriateness of dexmedetomidine and the specific patients in which it is most effective as a first-line sedative choice. Thus, the pilot study conducted by Smithburger and colleagues aimed to determine whether specific patient characteristics were associated with the effectiveness or ineffectiveness of dexmedetomidine as a sedative agent in mechanically ventilated patients.

The investigators conducted a single-center, single-MICU, 6-month observational study. The purpose was to generate hypotheses for future studies to determine patient characteristics associated with adequate, effective sedation with dexmedetomidine. For this study, the selection of a specific sedative for individual patients and the dosing of these medications was based on individual physician orders and clinical protocols for the MICU. During the study period, 38 patients received dexmedetomidine as the sedative of choice. Of these patients, 50% were female, with a mean age of 52 years (SD 13.7) admitted to the MICU in need of mechanical ventilation. Sedation ineffectiveness with dexmedetomidine was defined as "the addition of a continuous infusion of a sedative at any dose or the reinitiation of a previously discontinued sedative while dexmedetomidine was being administered." Level of sedation was determined every 2 hours by nursing staff using the Sedation Agitation Scale per unit protocol. A target sedation level was determined to be 3-4, indicative of "waking up with verbal or physical stimuli or easily arousable." A number of patient characteristics were considered in the analysis as predictive of dexmedetomidine effectiveness or ineffectiveness, such as antidepressant use at home, heavy alcohol consumption, history of depression, illness severity, etc. The interested reader is advised to refer to the table in the original article for the list of clinical indicators considered in the analysis.

Overall, dexmedetomidine was judged to be ineffective for 50% of the sample and effective for sedation in 29% of the patients; the remaining 21% of the sample were unable to be classified due to clinical condition. Lower illness severity (APACHE II scores) and home antidepressant use were found to favor effective dexmedetomidine sedation. In fact, lower illness severity was an independent factor related to effective sedation with dexmedetomidine. Other clinical factors such as amount of narcotics, benzodiazepines, antipsychotics, or total propofol infused did not differ between those patients who had effective sedation with dexmedetomidine as compared with those who had ineffective sedation.

■ COMMENTARY

Smithburger and colleagues present the findings from an observational study conducted in one MICU to determine patient factors that might be used to predict who will and will not receive effective sedation with dexmedetomidine. While any medication, including sedatives, can have

varying responses in critically ill patients, clinicians are still left to decide which sedative may best meet individual patient needs. However, we should not expect one sedative to meet the needs of all patients in the ICU. The findings from this small observational study suggest that dexmedetomidine may be more effective in patients who are less ill and taking antidepressant medications at home. These findings need to be tempered by a number of limitations. First, there is little information presented on these MICU patients, such as admission diagnosis, length of ICU stay, length of ventilatory support, what agents were administered prior to dexmedetomidine, or if dexmedetomidine was the first agent of choice. It will be informative to read about future prospective, controlled studies by Smithburger and colleagues that will hopefully shed some light on the appropriate administration of dexmedetomidine and other sedatives based on evidence, not on individual physician preferences. ■

CME Instructions

To earn credit for this activity, please follow these instructions:

1. Read and study the activity, using the provided references for further research.
2. Scan the QR code to the right or log on to www.cmecity.com to take a post-test. Tests can be taken after each issue. First-time users must register on the site using the 8-digit subscriber number printed on your mailing label, invoice, or renewal notice.
3. Pass the post-test with a score of 100%; you will be allowed to answer the questions as many times as needed to pass.
4. After completing the test, complete and submit an evaluation form.
5. Once the evaluation is received, a credit letter is emailed to you instantly.

CME/CNE Questions

1. Which of the following is *false* regarding ventilator-associated pneumonia (VAP)?
a. Approximately 60% of cases cannot be confirmed by microbiologic cultures.
b. Some clinical criteria used for diagnosis are highly subjective.
c. There is definitive proof that VAP can be eliminated by use of the prevention bundle.
d. VAP rates in Europe are 5 times higher than in the United States.

2. Which of the following statements regarding the risk of hand contamination with *C. difficile* spores among health care workers caring for patients with *C. difficile* infection is true?
a. Contact precautions offer 100% protection against hand contamination.
b. Hand contamination occurred in some health care workers despite glove use.
c. Hand contamination occurred among health care workers who cared for patients without *C. difficile* infection.
d. Hand contamination only occurred when gross fecal contamination was observed.

3. The following were all associated with a higher risk of hand contamination *except*:
a. a higher number of patient contacts.
b. a higher number of high-risk contact activities.
c. a longer exposure to high-risk contact activities.
d. at least one contact without gloves.
e. washing hands with soap and water prior to leaving the room.

4. Which of the following was demonstrated in the study of the implications of a second episode of clinical deterioration prompting activation of a hospital's RRS?
a. Patients who experience two or more MET activations have increased hospital lengths of stay.
b. Patients with COPD are more likely to have two or more MET activations during hospitalization.
c. Rapid response systems reduce mortality.
d. Less stringent criteria for ICU admission would decrease in-hospital mortality.

5. Among patients over 50 who were admitted to the ICU, being assessed as "frail" (with a rating of ≥ 5 on the clinical frailty scale) was associated with which of the following?
a. Increased in-hospital mortality
b. Increased overall mortality over the next 12 months
c. Decreased likelihood of living independently at home after discharge
d. All of the above

6. In the study methods used by Smithburger and colleagues in the study of sedation during mechanical ventilation:
a. choice of sedative was assigned by a table of random numbers.
b. all patients received continuous infusions of fentanyl.
c. nurses were blinded to the specific infusion that was administered.
d. Sedation Agitation Scores were determined by nursing staff every 2 hours.