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Critical Care [ALERT]

Authoritative, evidence-based summaries for the critical care clinician

SPECIAL FEATURE

ICU Capacity Strain

By Betty Tran, MD, MSc, Editor

Intensive care in the United States accounts for nearly 1% of the gross domestic product, and it is forecasted that there will be increasing demand for this type of care in the future as the population ages.[1,2] Given current projections that the supply of ICU staff and beds will be constrained rather than expand to meet this increasing demand, ICUs will be faced with the challenge of continuing care delivery under conditions of increasing strain.[2] Thus, there is growing interest in studying ICU capacity strain, defined as the temporally varying influence on a given ICU's ability to provide high-quality care for patients who are or could be cared for in that ICU on any given day.[3]

IS THERE AN OPTIMAL MEASURE FOR ICU CAPACITY STRAIN?

A singular, optimal, validated measure of ICU capacity strain remains elusive. Theoretically, many elements can contribute to an ICU's capacity to provide high-quality care equitably and include: the number of clinical providers available in the ICU (physicians, physician extenders, nurses, respiratory therapists, pharmacists, etc.), the efficiency of these providers, the number of available ICU beds and other fixed resources (e.g. ventilators, dialysis machines), the number of patients in need of an ICU bed (both current and new admissions), and the acuity of these patients.[3]

As such, studies focused on outcomes related to ICU capacity strain have used one or a combination of these elements as their primary exposures. Since no single variable is able to capture all the elements that contribute to the complexity of ICU capacity strain, each has its advantages and disadvantages. For example, multiple studies have used either number of available ICU beds, percentage bed occupancy rate, or ICU census, as these are intuitively associated with ICU capacity strain and easily measured. Disadvantages to using these measures are that they do not account for patient acuity, which can strain providers' time and resources, or distinguish between current patients and new admissions, which usually involves more time and resource use up front.[3]

More complex measures of ICU capacity strain include adjustments for patient flow and acuity, although these also have disadvantages. For example,

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some recent studies have used the number of new admissions to an ICU in a day to account for patients who are likely to contribute to ICU capacity strain due to their consumption of increased provider time and energy; this, of course, assumes that the existing ICU census is less time-consuming and/or existing ICU patients are somehow less acute. Adjustment to ICU census can be made for patient acuity as measured via the Acute Physiology and Chronic Health Evaluation (APACHE) II score or the Mortality Prediction Model. Although these are validated scoring systems for patient severity of illness and prognosis, they are more difficult to measure given the need for medical data collection, which can be time-consuming and problematic in retrospective studies or in studies using administrative data.[3]

Interestingly, when physicians and nurses were surveyed on perceptions of ICU capacity strain, increased ICU census was associated with increased perceived capacity strain among both physicians and nurses.[4] Among charge nurses, higher average patient acuity (assessed via APACHE II score) and higher census on the general medical wards were also associated with increased perceived capacity strain.[4] Overall, there was moderate correlation between the perception ratings of physicians and nurses on the same day (intraclass correlation 0.45; 95% confidence interval [CI], 0.30-0.60).[4]

Although an optimal measure for ICU capacity strain has yet to be found, once developed and validated, the hope is that it can be used in future critical care research to detect the significant effects of interventions by reducing the unexplained variance in outcomes and organizational characteristics of ICUs that enable some to accommodate increasing strain better than others.[3]

WHAT ARE THE OUTCOMES ASSOCIATED WITH ICU CAPACITY STRAIN?

Theoretically, high demand for critical care relative to available supply on any given day could strain providers' abilities to deliver high-quality care equally, limit the time and thought they can devote to each individual patient, and influence decisions regarding ICU admission and goals of care. Several studies have focused on outcomes due to strained ICU capacity.

Brown et al reported that for increasing daily admissions in a single academic ICU, daily rounding time increased, but less time was spent on each patient, particularly new admits; newly admitted patients received 1.38 fewer minutes (95% CI, - 2.43 to - 0.33 minutes; $P = 0.002$) of total rounding time and 0.73 fewer minutes (95% CI, -1.42 to - 0.07 minutes; $P = 0.0113$) of cognitive rounding time (time spent on the patient's assessment and plan) per additional admission.[5]

Most other studies have chosen mortality as a primary outcome, with mixed results. An early study at a single center in Scotland found that patients exposed to times of high ICU workload (as measured by peak occupancy, average nursing requirement per occupied bed per shift, and ratio of occupied to appropriately staffed beds) experienced three-fold higher adjusted hospital mortality (odds ratio [OR], 3.1; 95% CI, 1.9-5.0) compared to patients where the ICU workload was only moderate during their stay.[6] In a larger study in Manitoba, Chrusch et al found that discharge from the ICU when there was no vacancy was associated with an increased relative risk for readmission or unexpected death within 7 days of ICU discharge after adjustment for age, diagnosis, APACHE II score, and ICU length of stay (relative risk, 1.56; 95% CI, 1.05-2.31); the implication here is that increased ICU capacity strain can affect physician decision-making and result in premature discharge from the ICU.[7] Coming from a different angle, a multicenter study from France reported that compared to patients who were admitted immediately to the ICU on request, those whose admissions were delayed due to a full ICU unit had an increased incidence (although nonsignificant) of death on day 28 (OR, 1.78; 95% CI, 0.99-3.21), and day 60 (OR, 1.83; 95% CI 1.03-3.26).[8] The authors concluded that ICU bed shortage could result in a lost opportunity and subsequently preventable deaths. In a similar vein, decreasing medical ICU bed availability was found to be significantly associated with increased ward cardiac arrest rates (OR, 1.25; 95% CI, 1.06-1.49), although causality in this study cannot be implied, as it could not be determined whether those who suffered cardiac arrest were evaluated for transfer to the ICU prior to their arrest.[9] In the largest study to date consisting of > 260,000 patients admitted to 155 U.S. ICUs, higher standardized ICU census (to account for comparisons among ICUs of different sizes) on the day of admission was associated with an increased odds that admitted patients would die in the hospital (OR for a standardized unit increase, 1.02; 95% CI, 1.00-1.03; $P = 0.02$); this effect strengthened when the standardized census consisted of sicker patients (OR, 1.06; 95% CI, 1.01-1.11 for the highest decile of ICU acuity).[8] Similar results were observed for the outcome of ICU mortality.[10]

On the other hand, several studies have not reported an association between ICU capacity strain and hospital mortality.[11-15] Using the APACHE clinical information system for 200,499 patients admitted to 108 ICUs, Iwashyna et al did not find a difference in rates of hospital mortality or transfer to another hospital on increasing census days, suggesting hospitals included in the study were able to scale up their functions to meet a wide range of strain conditions.[14] Using data from the Project IMPACT database of 194 ICUs in 131 hospitals, Wagner et al found that elevations in ICU capacity strain (measured by ICU census, admissions, and acuity) were associated with increased odds of ICU readmission within 72 hours, but were not associated with increased odds of in-hospital death or decreased odds of discharge.[15] Although the study found that higher levels of ICU capacity strain (comparing 95th percentile vs 5th percentile of all strain variables) resulted in a 6.3 hour reduction in expected ICU length of stay (95% CI, 5.3-7.3 hours), the results of this study contrast the findings by Chrusch et al[7] by suggesting that physician decision-making during times of high ICU capacity strain may actually result in better ICU efficiency rather than rationing care to the detriment of some patients.[15]

Studies are more consistent in their findings that increased ICU capacity strain is associated with increased risk of unplanned readmissions. As previously discussed, Chrusch et al found that increased ICU occupancy was associated with an increased risk of readmission within 7 days.[7] In the Wagner et al study, for every one-unit increase in census, the odds of 72-hour readmission increased 3% ($P = 0.030$). Similarly, for every 10% increase in patient acuity among those already admitted to the ICU, there was a 5% increased odds of ICU readmission ($P = 0.019$).[15] Similar findings were seen when the primary ICU capacity strain variable was ICU bed availability,[9] and were even more pronounced in a study based in a neurosciences critical care unit, in which patients discharged on days with > 10 admissions had more than twice the odds of unplanned ICU readmission within 72 hours (OR, 2.34; 95% CI, 1.27-4.34) compared to those discharged on days with less than nine admissions.[16]

ICU capacity strain may also have an effect on end-of-life decision-making in the ICU. A multicenter study in Alberta, Canada, found that more patients had their goals of care changed from resuscitative care to comfort care when zero ICU beds were available compared with when > 2 ICU beds were available(14.9% vs 8.5%; $P < 0.01$).[13] In fact, changes in goals of care from resuscitation to comfort were 89.6% more likely when zero ICU beds were available compared to > 2 (95% CI, 24.9%-188.0%).[13] Interestingly, hospital mortality in this study was similar for patients, regardless of the available ICU beds, implying that the available ICU beds at the time of a patient's clinical deterioration affects processes of care, but not necessarily hospital mortality.[13] Similarly, a retrospective cohort study of > 9,000 patients in the United States found that various measurements of ICU capacity strain were associated with shorter time to do-not-resuscitate orders and, subsequently, death among patients with limitations to life-sustaining therapy in the ICU. There was no association between ICU capacity strain and time to death for those without limitations in therapy.[17]

HOW CAN WE REDUCE THE NEGATIVE CONSEQUENCES OF ICU CAPACITY STRAIN?

Recognizing the outcomes associated with ICU capacity strain is important, but next steps will be to determine how to reduce the negative consequences of strain. One approach is to improve average length of stay in the ICU, which can subsequently improve throughput and quality of care. Several well-known interventions include spontaneous breathing trials, daily interruption of sedation, and early physical and occupational therapy. If applied successfully and consistently, they can significantly affect an ICU census.[18] If findings from these interventional trials are applied to a hypothetical ICU, for example, "wake up and breathe" protocols (i.e., paired daily interruption of sedation and spontaneous breathing trial) could allow ICUs to care for 847 more patients per year by decreasing average ICU length of stay, without the need to build additional beds or increase capacity.[18]

Another consideration would be to identify certain structural characteristics in the ICU that may have an effect on how each one responds to capacity strain and evaluate their outcomes. In other words, what types of ICUs adapt better to increasing strain without sacrificing quality of care, and can their organizational qualities be applied to other, less flexible ICUs? For example, Gabler et al reported that standardized census in the ICU was associated with increased odds of in-hospital and ICU death overall, but also found that this effect was greater in ICUs with closed physician staffing models compared to those with open physician staffing models (OR, 1.07; 95% CI, 1.02-1.12 vs OR, 1.01; 95% CI, 0.99-1.03, respectively).[10] The authors hypothesized that this finding could be explained by the observation that during periods of high capacity strain, less time is allocated to patients in a closed staffing system with a limited number of providers as opposed to being more widely distributed in an open system. Indeed, others have confirmed that during times of high strain, less time is devoted on rounds per patients.[5]

It is worth mentioning, however, that the relationship between patient volume and mortality is not as straightforward as one may think. In a study of 39 trauma centers, a highly specialized field, Marcin et al reported that higher monthly trauma admission volume was associated with an increased risk of 30-day readmission for elderly trauma patients, and higher annual trauma volume was significantly associated with an increased risk of readmission for nonelderly adult trauma patients.[19] This is despite the finding that elderly trauma patients treated at centers with high annual trauma volume had lower mortality (OR for each 100 admissions, 0.79; 95% CI, 0.71-0.87).[19] Similarly, a multicenter study of European ICUs found that a higher ICU occupancy rate was associated with increased hospital mortality (OR, 1.324; 95% CI, 1.133-1.548), but annually, hospital mortality for all admitted ICU patients decreased by 3.4% for every five extra patients treated per bed per year in the same ICU, and by 17% for every five extra high-risk patients (Simplified Acute Physiological Score II above median for those staying longer than 47 hours).[20]

Findings from all these studies initially appear contradictory, especially in light of prior data showing that high-intensity staffing models reduce hospital and ICU mortality and length of stay.[21] Although closed ICUs provide high-quality care under average conditions, they may experience more adverse outcomes under high-demand conditions. As such, they may need additional strategies and policies to balance workload demand and supply compared to ICUs with different staffing models. Although regionalization of care can result in increased capacity strain for a particular center at certain times with possibly untoward consequences, it can still improve patient survival overall by concentrating patients in centers where there are concentrated resources and specialized expertise. In other words, between-hospital volume and within-hospital volume are separate and distinct hospital-level characteristics that can affect patient care differently. Further efforts to reduce the effects of ICU capacity strain and/or enhance an ICU's ability to adapt during periods of strain may need to focus on intensivist-directed ICUs in high-volume hospitals.

SUMMARY

ICU capacity strain results from an imbalance between demand for ICU high-quality care and supply. As such, it's disconcerting to consider that the outcome for a patient admitted to the ICU is related not only to the patient's own severity of illness, but also dependent on the state of the ICU itself in terms of other admissions, acuity, and census. There is still much work to be done with regard to defining a valid and optimal measure for ICU capacity strain. The hope, however, is that development of a valid metric will facilitate further outcomes research in terms of identifying effective ICU structural characteristics that can withstand strain, improving the transparency and equity with which critical care is rationed during times of strain, and studying the effects of interventions that could improve outcomes of ICU capacity strain. ■

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ABSTRACT & COMMENTARY

Head-elevated Positioning May Decrease Complications of Emergent Tracheal Intubation

By Eric Walter, MD, MSc

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

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

SYNOPSIS: In emergent intubations, a position in which the angle of the back was > 30 degrees above the horizontal (head-elevated) position was associated with fewer complications than intubations performed in the supine position, but the study has several limitations.

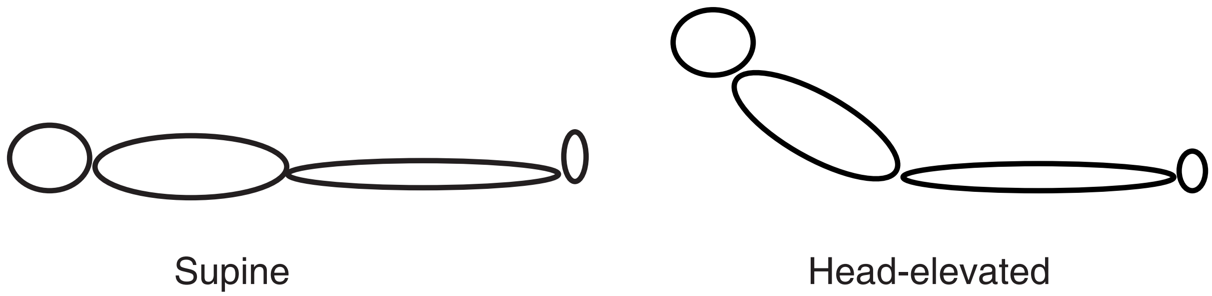
SOURCE: Khandelwal N, et al. Head-elevated patient positioning decreases complications of emergent tracheal intubation in the ward and intensive care unit. *Anesth Analg* 2016:122:1101-1107.

Emergent endotracheal intubation is a life-saving procedure commonly performed in the ICU. It is also a risky procedure with potential life-threatening complications. Back-up, head-elevated (BUHE) describes a patient position that has been shown in the surgical patient to improve preoxygenation and glottis views during direct laryngoscopy. The BUHE position differs from the sniffing position by ensuring the angle of the back is above the horizontal plane.

Khandelwal et al retrospectively sought to determine if the BUHE position (defined as head-elevated position in this study), as compared to a supine position, was associated with decreased complications during emergent intubation on the wards or in the ICU. Head-elevated was defined as placing the angle of the back ≥ 30 degrees above the horizontal (*See Figure 1*). Anything < 30 degrees was categorized as supine. The primary outcome was a composite of airway complications during or shortly after intubation. Complications included hypoxemia (SpO_2 < 90% during or within 15 minutes of intubation if it had been > 90% before induction), esophageal intubation, pulmonary aspiration (immediate peri-induction observation of gastric contents), or difficult intubation. Difficult intubation was defined as ≥ three attempts at intubation, airway management of > 10 minutes, or the need for a surgical airway. The authors attempted to control for predicted intubation difficulty by calculating the MACOCHA score, a previously validated score that accounts for Mallampati classification, sleep apnea, cervical mobility, mouth opening, coma, severe hypoxemia, and intubation by a non-anesthesiologist. At the authors' institutions, an anesthesia trainee or nurse anesthetist and an attending anesthesiologist managed all ward and ICU intubations. For purposes of this study, the authors replaced the term "non-anesthesiologist" with junior operator (anesthesia trainees with < 12 months experience). A MACOCHA score > 3 predicts difficult intubation.

Over a 1.5 year period, 528 emergent intubations met criteria for evaluation. Of these, 192 were performed in the head-elevated position. Patients intubated in the head-elevated position were more likely to be intubated by senior operators and were more likely to have a MACOCHA score < 3 (not have a predicted difficult airway). Complications occurred in 18/192 of the head-elevated patients compared to

Figure 1



76/336 of supine patients. This difference was largely driven by more patients in the supine group with hypoxemia (17% vs 6.3%). After adjusting for MACOCHA score and body mass index, head-elevated position was associated with a lower odds of complications (odds ratio [OR], 0.42; 95% confidence interval [CI], 0.23-0.77; P = 0.005) but not difficult intubation (OR, 0.88; 95% CI, 0.24-3.21; P = 0.848). Results did not change after adjusting for operator experience.

■ COMMENTARY

The authors' hypothesis *a priori* was that the head-elevated position would be associated with a lower risk of complications due to improved visualization and therefore decreased risk of a difficult intubation. Their analysis showed an association between head-elevated position and lower risk of complications, but this was driven primarily by a decreased risk of hypoxemia and not difficult intubation. This is an interesting finding but certainly not definitive, as there are several limitations to this study. The study was retrospective and relied primarily on intubation providers' self-report of complications. Under-reporting of complications is a significant possibility. Interestingly, junior operators were more likely to intubate patients in the supine position than senior operators. Despite attempting to control for operator experience, it is possible that the increased risk of complications was due to operator experience and not patient positioning. At the study's institutions, professors teach the head-elevated position as the preferred method of intubation unless there are contraindications. However, only about one-third of intubations occurred with the head elevated. The reasons practitioners chose one method over another is not available. Senior operators were far more likely to choose this position but still used this position in less than half of intubations.

The results of this study are not likely to be generalizable to the majority of emergent endotracheal intubations in the ICU. As opposed to many ICUs where intensivists manage the airway, in this study, all practitioners were anesthesiologists. In addition, many of these anesthesiologists were still in training. This study only evaluated patients intubated on the first attempt with direct laryngoscopy. In many ICUs, use of video laryngoscopy is common. A recent meta-analysis reported that in the ICU, video laryngoscopy was associated with a lower risk of difficult intubation and other complications than direct laryngoscopy.[1] At the author's institutions, video laryngoscopy was available, so it is possible that patients assumed to exhibit the most difficult airways were excluded from this study by practitioners choosing to begin with video laryngoscopy.

In summary, patient positioning is often a critical element for a successful endotracheal intubation. In the operating room, the BUHE position appears to have some advantages over the supine position. In the ICU, positioning may even be more important. It was reasonable to assume that the head-elevated position would be associated with decreased complications. However, it is not clear that this has been answered definitely. Further studies should include providers other than anesthesiologists, control for the use of video-laryngoscopy, and use prospective data collection. ■

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ABSTRACT & COMMENTARY

Are Nighttime Extubations in the ICU Safe?

By Kathryn Radigan, MD, MSc

Attending Physician, Division of Pulmonary and Critical Care, Stroger Hospital of Cook County, Chicago

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

SYNOPSIS: Compared to daytime extubations, ICU patients who undergo planned extubation at night do not experience higher likelihood of reintubation, increased length of stay, or increased mortality.

SOURCE: Tischenkel BR, et al. Daytime versus nighttime extubations: A comparison of reintubation, length of stay, and mortality. *J Intensive Care Med* 2016;31:118-126.

Although studies have shown that aggressive extubation protocols lead to decreased length of stay (LOS) and improved outcomes, the safety of planned nighttime extubations is unknown. Tischenkel et al conducted a retrospective cohort study of mechanically ventilated patients from July 2009-May 2011 to determine whether nighttime extubations were associated with higher reintubation rates, mortality, or LOS. The trial was conducted in two hospitals within a tertiary academic medical center that included all adult ICU patients except for those extubated due to withdrawal of life support. Patients who were extubated between 7:00 a.m. and 6:59 p.m. were considered the daytime group, and those extubated between 7:00 p.m. and 6:59 a.m. were considered the nighttime group. Nighttime staffing included attending physicians, respiratory therapists, and fellows who were in-house at all times but took care of twice the number of ICU patients when compared to daytime hours. The nursing ratio in all ICUs was 1:2 at all times. Of the 2240 extubated patients analyzed, 1555 were daytime extubations and 685 were nighttime extubations. For the patients who were extubated during the day, 119 were reintubated within 24 hours, compared with 26 in the nighttime group after multivariable adjustment (odds ratio [OR], 0.5; 95% confidence interval [CI], 0.3-0.9; P = 0.01). At 72 hours, there was a similar trend that was not statistically significant (OR, 0.7; 95% CI, 0.5-1.0; P = 0.07). Additionally, there was a trend toward decreased mortality for patients who were extubated at night (OR, 0.6; 95% CI, 0.3-1.0; P = 0.06) along with a lower LOS (P = 0.002). Patients who were extubated at night did not have higher likelihood of reintubation, LOS, or mortality when compared to patients who underwent daytime extubation.

■ COMMENTARY

Although this trial appeared to be conclusive, clinicians should discern whether this trial may be safely applied in their specific patient population. First, 82% of patients who were extubated overnight were from the cardiac surgery intensive care unit (CSICU). Since studies have shown that early extubation in cardiac surgery patients is associated with decreased LOS, morbidity, and mortality, patients from the CSICU were under protocols with the goal to extubate within 6 hours of the end of surgery. With this protocol in mind, it is more than likely the majority of the nighttime extubations were less critical in post-surgical patients who strictly met extubation criteria. Although the authors attempted to adjust for severity of illness with the Elixhauser score, this is a less commonly used severity of illness score, and the authors agreed that the statistical adjustment may be incomplete.

Furthermore, ICUs involved in this study were staffed by an in-house intensivist and fellow at night. This level of expertise may not be available in other ICU settings. Also, this particular institution adopted an aggressive weaning protocol that included daily sedation vacations and spontaneous breathing trials. These protocols were conducted by the respiratory therapists on a regular basis with physician consultation. In hospitals where similar staffing and protocols are not in place, it may be difficult to translate the results of this study to clinical practice.

Although this study reveals that nighttime extubations were not associated with increased risk of reintubation, LOS, or mortality, the application of this study to a general ICU population may be a stretch, unless the specific ICU reflects staffing and patient population similar to those in this study. Until there are more studies that examine this issue in a variety of ICU populations, there is insufficient evidence to support or refute the general safety of nighttime extubations in the ICU. Therefore, it is responsible to continue to be thoughtful regarding nighttime extubations in the ICU, always aware of the specific clinical situation and supportive staff in place. ■

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CME/CE QUESTIONS

1. Which of the following statements is true regarding measures of ICU capacity strain?

a. There is currently no valid, optimal measure.
b. Both physicians and nurses perceive high ICU census as consistent with high capacity strain.
c. A disadvantage to using bed occupancy is that it does not account for new admissions.
d. A measure that accounts for patient acuity is more time-consuming to develop.
e. All of the above

2. In the study by Khandelwal et al, which of the following statements is true?

a. The head-elevated position was defined as having the angle of the back ≥ 10 degrees above the horizontal.
b. The head-elevated position was associated with a decreased risk of difficult intubation.
c. Junior operators were more likely to use the back-up, head-elevated position than senior operators.
d. The head-elevated position was associated with a decreased risk of complications but this was not driven by a decreased risk of difficult intubation.
e. Most patients were intubated by intensivists; thus, the results are likely generalizable to many ICUs around the country.

3. The majority of patients who were represented in the study by Tischenkel et al were from a:

a. cardiac surgery ICU.
b. medical ICU.
c. surgical ICU.
d. combined medical/surgical ICU.
e. None of the above

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Upon completion of this educational activity, participants should be able to:

- identify the particular clinical, legal, or scientific issues related to critical care;
- describe how those issues affect physicians, nurses, health care workers, hospitals, or the health care industry; and
- cite solutions to the problems associated with those issues.

Critical Care Alert

Reader Survey 2016

In an effort to ensure *Critical Care Alert* is addressing the issues most important to you, we ask that you please take a few minutes to complete and return this survey. We will use these results to ensure you are receiving the information most important to you.

Instructions: Mark your answers by filling in the appropriate bubbles. Please write in your answers to the open-ended questions in the space provided. Please fax the completed questionnaire to **678-974-5419**, return it in the enclosed postage-paid envelope, or complete it online at: https://www.surveymonkey.com/r/CRCAnnualReaderSurvey. The deadline is **July 1, 2016**.

Following is a list of topics frequently discussed in *Critical Care Alert*. To help us understand your needs, please fill in the appropriate answer to indicate your interest in that topic.

	A. very useful	**B. fairly useful**	**C. not very useful**	**D. not at all useful**
1. ICU administration/management	O A	O B	O C	O D
2. Cost-effectiveness	O A	O B	O C	O D
3. Infections/infection control	O A	O B	O C	O D
4. Drug therapy	O A	O B	O C	O D
5. Manifestations of critical illness	O A	O B	O C	O D
6. Specific procedures/techniques	O A	O B	O C	O D
7. Ethics/end-of-life care	O A	O B	O C	O D
8. Health policy	O A	O B	O C	O D
9. Mechanical ventilation and respiratory failure	O A	O B	O C	O D
10. Evidence-based practice	O A	O B	O C	O D

11. Which of the following credentials do you have?

O A. MD/DO
O B. RN
O C. RRT/CRT
O D. other ______

12. Which of the following most accurately describes your clinical practice?

O A. Exclusively hospital-based
O B. Both hospital- and office-based
O C. Exclusively office-based
O D. Currently in training

13. In the future, how do you plan to obtain your CME credits?

O A. Travel to live conferences
O B. Subscription-based newsletters/journals
O C. Outside-sponsored teleconferences
O D. Internet-based activities
O E. Other ______

14. Which of the following do you personally do in your practice? (Fill in all that apply.)

O A. Make decision to admit a patient to ICU
O B. Make decision to discharge a patient from ICU
O C. Endotracheal intubation
O D. Tracheotomy
O E. Ventilator management
O F. Insertion of pulmonary artery catheters
O G. Hemodialysis/other renal replacement therapy
O H. Gastrointestinal endoscopy

15. Who pays for the *Critical Care Alert* subscription that you read?

O A. I do personally
O B. My practice/partnership
O C. ICU
O D. Department
O E. Medical library
O F. other ______

16. **In the abstract & commentary/special feature section of *Critical Care Alert*, compared to the way it is now, how much editorial comment and perspective would you like to see by the newsletter's contributing editors?**

O A. more O B. the same O C. less

17. **What type of information not currently provided in *Critical Care Alert* would you like to see added?**

18. **To what other publications or information sources about critical care do you subscribe?**

19. **Including *Critical Care Alert*, which publication or information source do you find most useful, and why?**

20. **List the top three challenges you face in your job today.**

1.
2.
3.

Contact information