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Serious Fun

Adding Summative Simulation-Based Testing to the CHEST Challenge

To the Editor:

In a recent issue of CHEST (January 2011), Khouli et al confirmed the power of simulation-based education for assessing trainee performance in a risk-free environment and improving that performance compared with traditional apprenticeship or video training. There was even an association with a clinical outcome, namely, reduced catheter-related bloodstream infections, although the patient outcome control groups were historical or in different populations (surgical ICU vs medical ICU).

For educators starting or improving their own simulation-based medical training programs, the right conditions and best practices from the Agency for Healthcare Research and Quality and Best Evidence in Medical Education Collaborative are reviewed in a CHEST supplement. Use of simulation for summative, high-stakes evaluation, such as certification and licensing examinations, is increasing. Some suggestions for designing one’s own summative evaluations are introduced here.

CHEST Challenge is the annual international contest of the American College of Chest Physicians in which teams of fellows in training compete by answering questions online and in live game show-style experiences. In 2010, skills assessment using high-fidelity medical simulation was added, constituting 10% to 20% of the total points awarded.

Evidence for defining skills, developing metrics, and evaluating reliability and validity of these assessments has been described. Prior to beginning the simulation component of the CHEST Challenge, the facilitator and graders practiced the clinical scenarios and agreed on standardized scoring by consensus. Players were oriented to the capabilities and limitations of the mannequin. Graders utilized valid, behaviorally anchored checklists (core actions were either present or not), although holistic (global) scoring also has value. Two graders were used for interrater reliability, but adding simulation tasks (broader domain sampling) may best improve overall reliability. Generalizability studies, if done, can further assess the sources and magnitude of measurement errors and help with test design. A trained facilitator played the role of the ICU nurse to ensure consistency and respond to participants for all technical limitations (eg, simulator does not sweat or have changes in skin color). As much as possible, player participants had to perform rather than just verbalize interventions. Finally, encounters were recorded on video; although intended for promotional value and quality assurance and not necessarily considered better than oral debriefing, these recordings can provide learners with valuable feedback and insights.

In a post-simulation anonymous survey (24/27, 89%), 58% of players indicated that they had used simulation equipment at their home institutions (usually for bronchoscopy or advanced cardiac life support training); 42% had participated in a simulation activity of the American College of Chest Physicians, and 29% did so elsewhere. Using a 5-point Likert scale, fellows responded that they were very comfortable with the simulator (mean ± SD, 3.96 ± 0.85; 71% positive vs 4% negative responses). Most enjoyed the testing (3.90 ± 1.06, 67% vs 13%) and believed that it was fair (3.96 ± 1.20, 75% vs 17%), and the majority would like even more added to next year’s CHEST Challenge (3.63 ± 1.35, 54% vs 21%). Some recommended additional exposure to the simulator prior to testing. Identifiable player information would be required to assess criterion-related validity.

Since 2002, CHEST Challenge has offered a fun forum, rewarding fellows for their medical knowledge and professional attitude. With more experience and guided by best evidence, we believe that summative simulation-based testing also will allow us to measure skills both in our game and in our fellowship training programs.

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Financial/nonfinancial disclosures: The authors have reported to CHEST the following conflicts of interest: Dr Kelly serves as Chair of the CHEST Challenge. Mr Dellert is a full-time employee of the American College of Chest Physicians. Under his direction, CHEST Challenge 2010 was integrated with the educational opportunities provided during CHEST 2010, including the simulation center. These areas are developed and implemented using a team-based approach from the committee leaders and instructional design staff of the American College of Chest Physicians. Dr Rosen served as Master of Ceremonies at the CHEST Challenge competition from 2005 to 2010.

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Cysteine as a Biomarker for Obstructive Sleep Apnea

To the Editor:

In a recent study in CHEST (February 2011), Cintra and colleagues nicely demonstrated the relationship between obstructive sleep apnea (OSA) and cysteine. In their study, cysteine levels were significantly elevated in patients with OSA regardless of their BMI, compared with the control group. Effective treatment of OSA with continuous positive airway pressure (CPAP) resulted in a significant reduction in cysteine levels. We congratulate the authors on their well-designed study and success in introducing a novel marker to the field of sleep apnea. However, we have some concerns:

- Tobacco smoking, hypertension, and a history of arterial atherosclerosis are known risk factors that are associated with elevated cysteine levels with, or even without, associated elevation in plasma homocysteine levels. Tobacco smoking, a major determinant of plasma cysteine level, was included in the exclusion criteria in this study. Hypertension and atherosclerosis could still be considered results of OSA, and, hence, higher cysteine levels could be considered a result of these conditions, not OSA.
- Cysteine levels can be affected by many other conditions, mostly associated with OSA, such as hypertension, atherosclerosis, age, and creatinine level. Hence, it is not specific for sleep apnea, unless those conditions are excluded before the measurement.
- A plausible explanation of hypercysteinemia in a patient with OSA is not provided in the study. If this marker is related to tissue hypoxemia, then patients with central sleep apnea, chronic respiratory failure by other causes, congestive heart failure, and possibly severe anemia would be associated with high cysteine levels.

A reproduction of this study’s results in a large, randomized, controlled study with measurement of cysteine levels (and maybe other candidate markers) before and after CPAP treatment and demonstration of relapse after discontinuation of CPAP is needed. This will also provide information about a good cutoff value for this marker if deemed reproducible. A good marker in OSA will have the ability to reduce the need for expensive polysomnography as a screening tool or possibly help monitor response to, and/or compliance with, CPAP treatment. So far, cysteine lacks specificity and does not fulfill those objectives.

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Response

To the Editor:

I read with interest the comments of Drs Alrajab, Uysal, and Jenks about our article,1 and I appreciate the contribution on our work. However, I would like to clarify some important points.

First, I agree that tobacco smoking may influence homocysteine and cysteine concentration, which is the reason why smoking was considered an exclusion criterion in this study and is not considered a confounding factor in our results. Moreover, the mechanisms involved in the relationship between smoking and homocysteine/cysteine concentration are still under investigation, and cigarette smoking seems to be a strong determinant of plasma homocysteine level, but the impact on plasma cysteine level should be better demonstrated.2

Second, I also agree that cysteine may be affected by many other conditions, such as arterial hypertension and age, and could be considered a risk factor for atherosclerosis in patients with hyperlipidemia.3 Moreover, obstructive sleep apnea (OSA) may lead to a number of cardiovascular consequences, such as arterial hypertension and atherosclerosis.4 Therefore, it seems to be another “chicken and egg” puzzle. In order to clarify this confusing relationship among cysteine, cardiovascular consequences, and OSA, we performed a longitudinal study with an effective continuous positive airway pressure treatment of 6 months, with a minimum usage of 5-4 h/night. Continuous positive airway pressure significantly decreased plasma cysteine levels after 6 months of treatment, suggesting that OSA directly affected cysteine plasma levels.

Third, the mechanisms explaining the increase in plasma cysteine levels and the corresponding absence of changes in homocysteine concentration and the related vitamin profiles are under investigation, but based on experiments by Perry et al.,5 OSA could directly affect cysteine concentration as mentioned in the “Discussion” section of the article. In this study, the combination of sleep...