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A Prospective Randomized Controlled Trial Comparing Simulation, Lecture and Discussion-Based Education of Sepsis to Emergency Medicine Residents

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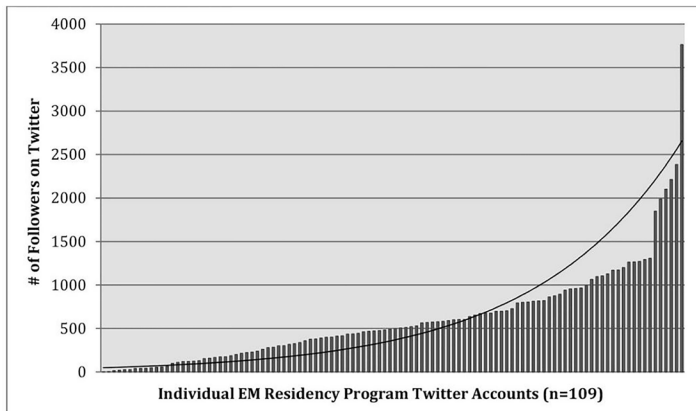
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**Figure 2.** Number of followers per EM residency program Twitter account.

### 3 A Multicenter Study of Grit And it's Relationship to Burnout

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**Background:** Burnout is a syndrome involving mental and psychological exhaustion, a reduced sense of accomplishment and self-esteem, and depersonalization in individuals whose work involves dealing with people. Burnout is common in physicians and the specific emotional and physical challenges of emergency medicine place Emergency Physicians at greater risk. Alternatively, grit, defined as “perseverance and passion for long-term goals,” attempts to quantify the ability of an individual to maintain sustained effort throughout an extended length of time. Grit has been found to be a superior predictor of success in several high-stress, high-achievement fields.

**Objectives:** We aimed to determine if grit, a novel character trait, is associated with resident burnout.

**Methods:** In November 2016, we conducted a multicenter cross-sectional survey at 3 large, urban, academically-affiliated emergency departments. EM residents in each centers training program were invited to provide anonymous responses to two validated survey instruments. Perseverance was measured using the Short Grit Scale. Burnout was measured with the Maslach Burnout Inventory. Categorical data are presented as frequency of occurrence; while continuous data are presented as means +/- std deviation, analyzed by two-tailed t-tests and correlation coefficients (Alpha = 0.05).

**Results:** 146 of 181 eligible residents (81%) completed the study (44 EM1, 42 EM2, 36 EM3, 24 EM4). 98 were males and 45 were females (3 identified as “other”). Grit was predictive of psychological well-being as measured by

the Emotional Exhaustion and Depersonalization subscales of the Maslach Burnout Inventory ( $r = -0.32, P < .01$  and  $r = -0.35, P < .05$  respectively). Analysis for variation by year in training showed that grit did not significantly differ by year in training but burnout did significantly differ, with EM 2 having higher levels of burnout than EM 1 and EM4 ( $P < .05$ ). There were no differences in grit or burnout when analyzing by gender.

**Conclusions:** There appears to be an inverse relationship between self-reported measures of passion and perseverance (grit) and burnout. Measuring grit may identify those who are at greatest risk for burnout. These residents may benefit from earlier counseling to provide support and improve resilience.

### 4 A Prospective Randomized Controlled Trial Comparing Simulation, Lecture and Discussion-Based Education of Sepsis to Emergency Medicine Residents

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**Background:** Septic shock is a life-threatening condition that is traditionally taught to Emergency Medicine (EM) residents in a lecture-based format. Studies suggest that simulation may be more effective in creating competence and comfort in students of EM in managing emergent medical conditions as compared to lecture.

**Objectives:** Our goal was to investigate whether there is a difference in acquisition and retention of medical knowledge and one's comfort level in diagnosis and management of sepsis and septic shock in EM residents taught using simulation (SIM) vs. lecture (LEC) vs. discussion-based learning (DBL). We hypothesized that SIM would improve immediate medical knowledge and confidence levels compared to LEC or DBL.

**Methods:** Subjects were enrolled in this prospective randomized controlled trial from a convenience sample of 35 EM residents present during a didactic day in April 2015 at a 4-year program. Computer generated randomization assigned subjects to one of three didactics on sepsis and septic shock (SIM, LEC or DBL). Each didactic lasted 30 minutes and was based upon a set of learning objectives. The SIM arm participated in a 15-minute one-on-one mannequin simulation followed by a 15-minute debriefing. The LEC arm obtained a lecture. The DBL arm participated in a case-based discussion. Medical knowledge was assessed using a 24 question multiple choice question (MCQ) test. A survey using a 6-point likert scale assessed comfort in diagnosis and management of septic shock. Assessments were

given right before the intervention (pre-test), immediately post-intervention (initial post-test) and 3-6 months post-intervention (delayed post-test). Performance on the MCQ test was compared using a mixed effects repeated measures model and used a Bonferroni correction. Differences in the comfort questionnaire were obtained using the Kruskal-Wallis test.

**Results:** All 35 subjects completed the pre-test and initial post-test. MCQ test scores improved in the SIM group compared to the DBL group on the initial post-test (baseline adjusted difference = 2.83, p=0.009). 34 subjects completed the delayed post-test. There was no difference between MCQ test scores comparing SIM with the LEC or DBL groups (p > 0.05). There was no difference in comfort levels between groups on the immediate or delayed post-tests (p>0.05).

**Conclusions:** Simulation serves as a non-inferior didactic modality to teach EM residents the topic of sepsis. Our study demonstrated superior immediate knowledge gain when comparing SIM to DBL, but not to LEC. There no difference in long-term knowledge retention between the three modalities. Limitations include the variable 3-6 months time period to collect delayed post-test. The long lag-time for subjects responding at the 6 month time point might have eliminated a difference that might have been seen at the 3 month mark. Also, variable exposure to simulation may have affected subjects' comfort level in the simulation, potentially affecting how well one may learn from simulation. Finally, subjects from all years of training were included. More senior residents might have expert knowledge that would minimize an effect that any of the interventions might have had.

## 5 A Quantitative Usability Analysis of the ALiEM Air Score

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**Background:** Emergency medicine (EM) residents are increasingly utilizing online education resources (OERs), however, they receive little instruction in assessing their quality. Academic Life in Emergency Medicine (ALiEM), an online education website, created the Approved Instructional Resources (AIR) rubric to curate and assess the quality of these OERs. The rubric was found to be reliable within a group of 8-9 experts in EM education. Its acceptability and ease of use by general medical students (MS), EM attendings, and residents has yet to be studied.

**Objectives:** This study aimed to evaluate the AIR rubric's usability in a general population of MS, residents and attendings. We hypothesized that residents and MS would have difficulty assessing the impact and accuracy of OERs.

**Methods:** A convenience sample of MS, EM residents, and EM attendings were obtained as part of the METRIQ Study through in-person recruitment, social media promotion, and e-mails from prominent OER authors. After evaluating 5 OERs with the AIR rubric, each participant completed a usability assessment as well as which rubric items they found difficult to apply. Of the 330 participants, 21 did not complete the usability analysis.

**Results:** Table 1 shows the demographics of the raters. Overall, the AIR rubric was rated as very easy to use. Across all three levels, the BEEM score was most frequently reported as difficult. The next two items in terms of difficulty related to article accuracy and the incorporation of EBM. [Table 2]

**Conclusions:** The ALiEM AIR rubric was designed for a group of EM educators. This was the first attempt to evaluate its usability among a broad population of OER users. The BEEM score component of the ALiEM AIR score was the most difficult for all three populations to use. Medical students and residents reported difficulty analyzing the impact and accuracy of OERs. This data will inform the modification of the AIR score to better facilitate quality assessment of OERs by end users.

**Table 1.** Population of ALiEM AIR Usability Testing Raters.

Rank	Attending Resident Medical Student	33.0% (109/330) 28.8% (95/330) 38.2% (126/330)
Gender Split	Female Male Other	39.4% (130/330) 60.0% (198/330) 0.6% (2/330)
Age	Average (SD)	31.2 (+/- 7.3) years
Level of Training	Medical Students Resident Attending Physicians	39.1% (126/330) 28.8% (95/330) 33.0% (109/330)
Manage, Own or Operate own blog?	Yes No	14.5% (48/330) 84.5% (279/330)
Country of Origin	United States Canada Other	37.9% (125/330) 45.2% (149/330) 16.9% (56/330)

**Table 2.** Quantification of Difficult Components of the ALiEM AIR Rubric.

Component of ALiEM AIR Score	Item Instructions	Total % of Raters that found this item difficult
BEEM Rater Scale	Assuming that the results of this article are valid, how much does this article impact on EM clinical practice?	28.2% (87/309)
Accuracy	Do you have any concerns about the accuracy of the data presented or conclusions of this article?	13.3% (41/309)
EBM	Does this article reflect evidence based medicine (EBM) and thus lack bias?	13.3% (41/309)
Educational Utility	Are there useful educational pearls in this article for residents?	11.0% (34/309)
Referencing	Are the authors and literature clearly cited?	10.7% (33/309)