

Educational Research Abstracts: 2015 NAEMSE Conference

What skills are students recording in the lab setting?

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Introduction

Students using simulation can safely perform advanced invasive procedures without anxiety and concern of risk to the patient. In addition, simulation provides students the opportunity to practice complex scenarios, which can lead to expertise and competency (Chiniara et al., 2013). Without adequate and accurate measure of cognitive and psychomotor skills, society cannot be assured that individuals who are functioning as providers are proficient in their skills and therefore performing those skills safely. Students experience an insufficient number of hands-on patient interactions and treatments (Chiniara et al., 2013; Lazarou, 2011). Consequently, students may not be able to fulfill certain learning objectives proposed by the curriculum. This study describes the frequency that students record lab activity with respect to successful and unsuccessful iterations of a given skill.

Hypothesis

Students are recording all iterations of skills practice in the lab.

Methods

Retrospective data was obtained from Fisdap, a national online EMS student tracking system, under Inver Hills Community College IRB approval. Student skill sheet data from para-

medic education programs utilizing lab skill sheets embedded in Fisdap from 2011-2014 was included. Thirty-nine distinct skills sheets were evaluated to compare successful attempts versus total attempts recorded. A minimum of one student evaluation for each skill is suggested.

Results

Of the students (n=706) meeting inclusion criteria 48.44% had less than the expected 39 total skill evaluations. Out of the total sample 67.7% (478) recorded a 100% success rate for all skills. Of the 39 total skill evaluations, success was recorded 89% of the time or greater. The skills with the greatest recorded frequencies were endotracheal intubation, intravenous therapy, normal delivery newborn care, intra-osseous insertion, defibrillation, and intravenous bolus administration. The skills pediatric orotracheal intubation, pediatric trauma orotracheal intubation and pediatric and adult respiratory compromise had zero instances recorded.

Conclusion

The majority of students report only successful attempts, which prohibits observation and documentation of the formative process toward skill mastery. Skill sheet components of the psychomotor package are being omitted including high risk low frequency skills. It is unclear if students receive adequate exposure to these skills in the lab setting.

The Assessment Connection: Effects of an Entrance Exam on Paramedic Course Completion

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Introduction

Paramedic education is a demanding process for which prerequisite entry criteria vary among programs. Academic and behavioral assessment tools specifically tailored to paramedic students are sparse, but their use could potentially reduce program attrition and further promote academic success. Created for this purpose, the FISDAP® Entrance Exam (EE) exam assesses students in four cognitive areas (Reading, Mathematics, Anatomy and Physiology [A&P], and prior EMT knowledge) and three affective areas (Agreeableness, Conscientiousness, and Neuroticism).

Objective

To investigate potential relationships between performance on the FISDAP® EE and subsequent academic success among paramedic students.

Methods

This IRB-approved, retrospective analysis was conducted using de-identified records of students who took the FISDAP® EE prior to starting a paramedic course. We included those who had achieved a graduation status of 'Completed' or 'Failed', while currently enrolled students were excluded. We used t-tests to compare EE category scores against demographic variables as well as gradua-

tion status. Multiple logistic regression analysis was performed using the scores from all seven EE categories to identify those areas in which performance may predict course completion.

Results

A total of 558 students met our inclusion criteria, with an overall attrition rate of 69% (n=385). There were no significant differences in the mean score for any category of the FISDAP® EE associated with demography. There were significant differences in the mean scores between those who graduated and those who did not in the categories of A&P (t = -3.97, p<0.01), Mathematics (t = -3.44, p<0.01), Reading (t = 3.79, p<0.01), Conscientiousness (t = 2.29, p=0.02), & Agreeableness (t = 2.59, p=0.01). The multiple logistic regression analysis showed that student performance in the categories of Reading (OR=1.06, 95% CI:1.02-1.09), A&P (OR=1.04, 95% CI:1.02-1.07), and Agreeableness (OR=0.97, 95% CI:0.96-0.99) significantly predicted course completion (R²=0.12, X²(7, N=558)=42.79, p<0.01).

Conclusions

Higher mean scores on the FISDAP® EE were present in all categories among students that graduated, with the exception of prior EMT knowledge and the level of neuroticism. Performance in the categories of Reading, A&P, and Agreeableness were associated with successful course completion, but the extent to which they predicted successful completion provides limited practical significance.

Sick Enough to Pass? The Effect of Paramedic Student Exposure to High Acuity Patients on Summative Exams

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Introduction:

In the EMT educational setting, field clinicals are believed to enable learners to utilize previously acquired knowledge in order to develop required cognitive and psychomotor competencies.¹ Research has found that the number of clinical placements and patient contacts associated with student success on the National Registry of Emergency Medical Technicians' examination.² However, the effect of case acuity on examination performance has not been described.

Hypothesis:

Increased frequency of contact with high acuity patients is associated with a student's probability of passing a summative cognitive examination.

Methods:

Paramedic student records from 2011-2014 in the FISDAP™ database were analyzed for EMS transports where students recorded an assessment of patient acuity. Initial attempts of the student summative exam were compared to the student assigned acuity categories. Students assigned acuity as "not critical," "illness/injuries not yet life-threatening," "life-threatening illness/injury," and "dead on arrival." Instructors verified student data. Transports were analyzed using a descriptive plot followed by a logistic regression for the acuity categories.

Results:

3376 EMS student transports were compiled. 1626 transports remained after excluding records where students rated patient acuity ≤10. Students recording participation in cases where 5-10% of all calls were coded as high acuity patients had a 33% increased likelihood of passing the summative exam (p<0.05). 31.5% of the transports were in this range. Exposure ≤5% decreased the likelihood of passing (p<0.05). Greater than 10% exposure to high acuity patients had a 38.5% increased likelihood of passing (p<0.05). There was no increased likelihood of passing with additional high acuity exposure. As exposure to

medium acuity case increased, so did the odds of passing. However, when exposure exceeded 65% the odds decreased.

Conclusions:

Paramedic students exposed to 10% of all calls with high acuity patients have an 8.7% increased likelihood of passing the summative exam compared to students exposed to less than 5% high acuity calls. This increased likelihood can help direct EMS educators select clinical settings where paramedic students can reach this beneficial exposure level. Future research should be directed at understanding why there is no additional benefit from students having the majority of their calls with high acuity patients.

The Association between EMS Credential Level, Years of EMS Experience, and Success on the North Carolina Paramedic Credentialing Exam

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Introduction:

Previous studies identified predictors of success on paramedic certification examinations. However, there is a paucity of research examining success on a paramedic credentialing exam based on EMS credential level or years of EMS experience.

Objective:

Assess the relationship of EMS credentials, years of EMS experience and North Carolina paramedic credentialing examination (NCPCE) success. It was hypothesized that there would be a difference in success based on EMS credential level and years of EMS experience.

Methods:

Data were obtained from the North

Carolina EMS Data System. NCPCE first attempts from 2010-2014 were included and the outcome of interest was pass/fail. Inclusion criteria required complete data for initial EMS credential date and level. To calculate years of EMS experience, initial EMS credential date was subtracted from NCPCE first attempt date. Descriptive statistics, univariate Odds Ratios (OR) and 95% Confidence Intervals (95%CI) were calculated. The Office of Human Research Ethics at University of North Carolina – Chapel Hill determined this study was exempt from IRB review.

Results:

3,198 individuals completed their NCPCE first attempt during the study period. 3,114 (97.4%) individuals met inclusion criteria and 2,782 (89.3%) passed. There were 2,647 (85.0%) EMT-Basics and 467 (15%) EMT-Intermediates. There was no significant difference noted when comparing EMS credentials and success with 2,371 (89.6%) EMT-Basics passing vs. 411 (88.0%) EMT-Intermediates (OR=0.85, 95%CI 0.63-1.16, p=0.313). Years of EMS experience ranged from <1 to 16.5 years (average=3.0±2.3). There was a significant inverse relationship between years of EMS experience and success (OR=0.82, 95%CI 0.74-0.92, p<0.01). The average years of EMS experience for those who passed was 3.0 years vs. 3.3 years for those who failed (p=0.02). Quartile categorization revealed significantly higher passing percentages for those with ≤1.4 years of EMS experience (≤1.4 years: 93.9% [referent]; 1.5-2.1 years: 88.6%, OR=0.59, 95%CI 0.41-0.85, p<0.01; 2.2-3.9 years: 90.0%, OR=0.68, 95%CI 0.47-0.99, p=0.04; ≥4 years: 86.3%, OR=0.48, 95%CI 0.34-0.69, p<0.01).

Conclusion:

There was not a statistically significant difference in NCPCE success when comparing EMT-Basics to EMT-Intermediates. A statistically significant inverse relationship between years of EMS experience and NCPCE success was revealed. Further studies should

evaluate these findings after adjusting for important covariates.

Empathy levels of student entering US paramedic education programs

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Introduction

Evaluation of the affective domain is an essential component of paramedic program accreditation in the United States. Empathy is an essential affective competency that graduating paramedic students are often required to display. Empathy has also been tied to patient satisfaction, greater diagnostic accuracy and reduced rates of clinical errors. Previous studies have described empathy levels in Australian paramedic students, and healthcare providers in general, using the previously validated Jefferson Scale of Empathy - Health Profession Student version (JSE-HPS) by Williams, et al (2015)

Hypothesis

Matriculating US paramedic students will display similar levels of empathy to those of Australian paramedic students.

Methods

Students enrolling in paramedic programs participating in Fisdap, a national online testing cooperative community, and completing the Fisdap Entrance Exam (EE), were asked to participate in this prospective cross sectional sample of convenience. Participating students completed the same JSE-HPS that has previously been used in Australia and Healthcare students in general. A t-test was used to compare US JSE-HPS values to those reported by Williams.

Results

A total of 606 consenting US paramedic students from 61 geographically diverse programs completed

the JPE-HPS between August 15, 2013 and March 27, 2015. The mean score for the US cohort was 110.00 (SD=13.99), compared to a mean of 108.60 (SD=12.50) for AU cohort. Results of the t-test suggest a statistically significant difference in empathy scores between the two groups (t=2.46, p=.014).

Conclusion

US paramedic students in this sample displayed higher levels of empathy than previously reported levels from their AU counterparts. While these levels appear similar to other Healthcare professions, more research is needed to determine if they are representative of the population of practicing paramedics in general, and what influence this may have on patient outcomes.

Is there a relationship between empathy levels and the personality traits of entering paramedic students?

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Introduction

Empathy is an essential affective competency that paramedic education programs are encouraged to measure to meet accreditation requirements. Previous studies have suggested a link between empathy and personality traits in other professions.

Hypothesis

Empathy levels of matriculating paramedic students are associated with personality traits of agreeableness, conscientiousness and neuroticism.

Methods

Paramedic students participating in Fisdap, a national online testing cooperative community, and completing the Fisdap Entrance Exam (EE), completed the previously validated Jefferson Scale of Empathy - Health Profession Student version (JSE-HPS

- Williams 2015) and applicable sections of the M5-50 personality inventory (McCord 2002). To understand the relationship between empathy and other traits, three regression models were fit to empathy scores.

Results

A total of 604 consenting students from 61 geographically diverse programs in the United States completed both inventories between August 15, 2013 and March 27, 2015. Mean scores were obtained for empathy (110.00; SD=13.99), agreeableness (80.43; SD=11.09), conscientiousness (81.63; SD=11.66) and neuroticism (25.66; SD=17.09). Results were statistically significant for all three regression models ($p < .01$) See Table 1. Each trait accounted for the following variability in empathy scores: agreeableness 8% ($R^2 = .08$), conscientiousness 5% ($R^2 = .08$) and neuroticism 1%. Higher neuroticism scores were associated with decreased levels of empathy.

Conclusion

Empathy scores are positively correlated to agreeableness and conscientiousness, while being negatively associated to neuroticism. More evidence is needed to understand the practical significance and use of these relationships in EMS education.

Entrance Exam Prediction on Paramedic Student Terminal Performance

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Introduction

Paramedic education can be costly and time consuming. Previous allied health entrance screening tools have been shown to have little predictive value to overall paramedic student success. Employers, students and educators could benefit from accurate pre-paramedic program assessment tools to guide admission and remediation of key abilities.

Hypothesis

Fisdap's entrance exam scores can positively predict passing the NREMT-CE on first attempt.

Methods

Paramedic programs using Fisdap, a national online testing cooperative community that measures paramedic student progress and summative competency, administered Fisdap's Entrance Exam (EE) to matriculating paramedic students. The EE is designed to measure cognitive ability with breakdowns in Math, Reading Comprehension, Anatomy, Physiology, and EMT level critical thinking. Program directors from participating institutions reported attrition and National Registry of Emergency Medical Technician Paramedic Cognitive Exam (NREMT-CE) performance results. A logistic regression model was fit to the data to determine if there was association with EE score and first time pass rates on the NREMT-CE.

Results

A total of 550 consenting students from 33 geographically diverse programs completed the EE between July 1, 2012 and August 30, 2013. Of these 177 (32%) attrited or were dismissed for poor academic performance ($n=47;9\%$), poor affect ($n=11;2\%$), or other reasons, including personal circumstances ($N=31;6\%$). Of the 340 graduating students, 293 (53%) passed the NREMT-CE on first attempt, and 47 failed (9%). The results of the logistic regression show a statistically significant, positive relationship between the EE and NREMT-CE first time pass rate ($p < .001$). The results suggest that for every 10 point increase on the Entrance Exam, a student's odds of passing increases by 87%. Odds of passing for the average score on the Entrance Exam, 79.53, is 92%.

Conclusion

Fisdap's Entrance Exam scores positively predict first time pass rate on the NREMT-CE. Further research is needed to understand the best use of these data to increase retention and improve pass rates.

Are paramedic students more likely to administer analgesia during lab then during field internship?

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Introduction:

Research in EMS has indicated that paramedics, for a wide variety of reasons, choose not to administer analgesia to patients. The paramedic instructional guidelines and current paramedic textbooks review a variety of analgesia and appropriate use in the prehospital setting. This suggests that paramedics are given the knowledge for administering pain management but are choosing not to administer it to their patients.

Hypothesis:

Paramedic students are more likely to administer analgesia during patient simulations in the lab then they are to administer it to patients in the field.

Methods:

Data was collected from the FIDAP skills tracking system with IRB approval from Inver Hills Community College. A total of 527 patients were evaluated, including 124 simulated trauma patients and 403 trauma patients during field internship. All of the cases have isolated extremity injury with a systolic blood pressure greater than 100. There were 14 cases, 5 paramedic students, who were removed because they did not have at least 1 lab case and 1 field case. The remaining sample is 513 patients, of which 110 are simulated patients and 403 are trauma patients during field internship. These patients were evaluated to determine if the paramedic student administered analgesia to help manage their pain.

Results: During lab simulation, 39 patients (35%) received some sort of pain management from paramedic students. Paramedic students administered analgesia to 33% of patients during their field internship. Paramedic students who administered pain management to at least 1 patient

in the lab setting administered analgesia in the field setting 29% of the time. Paramedic students who did not administer analgesia in the lab setting administered pain management to traumatic patients from our sample in the field 33% of the time.

Conclusion:

Paramedic students only administered pain management to isolated extremity injuries 34% of the time. Paramedic students are just as likely to administer pain management in the lab setting as they are during their field internship. Administering pain management in the lab setting did not increase the likelihood of analgesia administration in the field setting.

Paramedic Student Team Lead Utilization of MD Consultation: Hello Doc... Are you there?

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Background

Studies suggest the use of online physician consultation can improve patient care. EMS guidelines indicate utilizing physician consultation when a patient's condition does not conform to standard protocol. This study examines the frequency of paramedic student team leads (PSTLs) decision to access physician consultation during prehospital cardiac patient encounters.

Hypothesis

PSTLs consultation with physician leads to increased use of cardiac interventions and medications.

Methods

Paramedic student data from Fisdap™, an internet-based administrative database, was retrospectively reviewed from 01-01-2011 to 12-31-2014 for experiences with the follow-

ing criteria: student provided consent for research and patients with a primary or secondary cardiac impression (excluding cardiac arrest). Patient care was analyzed based on interventions and medications administered. Statistical analysis was performed using descriptive statistics, frequency counts, and generalized linear modeling.

Results

A total of 8,800 patient contacts treated by 1,008 PSTLs were included in the analysis. There were 288 physician consultations performed on 277 different patients. Of these 1,008 PSTLs, only 8.7% (n=88) called for physician consultation. The number of cardiac medications administered increased significantly ($p < 0.001$) with PSTLs who performed a consultation. The gender and age of the PSTL had no significance on the likelihood of physician consultation. PSTLs that made a physician consultation averaged 3.3 consults compared to the other 91.3% of PSTLs with no physician consultations.

Conclusion

Despite advancement of telecommunications, physician consultations remain low. PSTLs who consulted a physician when treating cardiac patients were more likely to administer medications compared to those who did not. This could be due to the advanced medical decision making of the physician providing assistance to the paramedic or the likelihood that patients who prompted a consultation were more acutely ill therefore requiring higher level of care. Further research should explore whether qualities of the PSTL impact likelihood of physician consultation, as well as whether variance in patient care with physician consultations impacts patient outcomes.

Early exposure to valid test items improves EMT student performance on summative exams

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Introduction

There are several avenues for formative testing available to EMT programs, however most are not validated. Research in a variety of healthcare educational disciplines shows that valid formative examinations improve student outcomes on summative exams. Existing EMS-specific research is scarce on this subject.

Hypothesis

Exposure to valid, formative, secure EMT exams is predictive of success on valid, summative EMT exams.

Methods

EMT Readiness Exam 2 (ERE2) and EMT Unit Exam (EUE) results were retrospectively collected from Fisdap, an online EMS education data collection system from December 2010 through December 2014. Inclusion criteria consisted of student consent to research. Data points for the ERE2 and each EUE included scores and program ID. Data was fit to a hierarchical linear model (HLM) where level-1 contains information about the number of unit tests taken by a student and level-2 intercept for program affiliation.

Limitations

There are a number of unknown variables that this study does not control for including: context of EUE use (as pre-tests, module end exams, or pre-final exam prep), if exams were included in grade calculation and if there was any student exposure to other valid formative exams prior to the ERE2.

Results

The mean score of those students

who took no EUEs was 67% (n = 22,359) while those who took all six exams was 71% (n = 1,557). Using the HLM to control for students in the same program, students who took all 6 unit exams still scored 1.8% higher on the ERE2.

Conclusion

Improvement in EMT student scores on the ERE2 was correlated with the previous exposure to all six EUEs. Given the predictive value of the ERE2, this small increase in average score would result in more students achieving success on the NREMT certification exam. Based on ERE2 pilot statistics, at the average score without any unit exams (67%), about 74% of students could be expected to achieve first-time NREMT success. At the average score with formative exams (71%), that percentage increases to 92%. Given this result, EMT training program directors should consider using validated formative exams.

How good is good enough? Predicting team leadership competency in graduating paramedic students.

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Introduction

Previous research in EMS and anesthesia has described the successful use of a "Eureka Point" (EP) model to visualize continued skill competency (Wilson 1996, Howey 2005). In 2013 Cage et al. used the EP model to demonstrate that students reaching the goal of 90% team leadership (TL) success rate (18 successful leads of the last 20 attempts) described in the National Registry of EMTs Psychomotor Competency Package (NREMT-PPCP), would maintain TL success 87% of the time. In this study we sought to explore the optimization of a minimum EP goal needed for continued competency.

Research Question

What is the minimum number of successful team leads needed to predict continued competency in paramedic student (PS) graduates?

Methods

During field internships PS's involved in the NREMT-PPCP, chronologically recorded TL performance after every patient encounter in FISDAP® (Headwaters Software Inc., St. Paul MN). Using regression, our algorithm cycled through potential EP success ratios. Students who maintained a 90% success rate after initial EP attainment were reviewed at four check points: 5, 10, 15, and 20 TL attempts beyond initial EP. PSs were considered 'successful' if they maintained a 90% TL success rate.

Results

From Fisdap we retrieved TL evaluations for 420 consenting students between January 2009 and December 2011. See table 1 in the attached figure.

Conclusion

These results allow for programs to select the degree of optimization they desire to more accurately predict continued competency in team leadership.

Diversification in EMS: Are we as diverse as we think we are?

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Introduction

Research shows that the demographics of EMS professionals in the United States are not diverse and there is a lack of studies examining the demographics of individuals pursuing an EMS career. Understanding the changing demographics of individuals pursuing EMS allows educators to better

prepare for their audience and changing learning environment. This study describes the diversification of EMS students during the past six years.

Hypothesis

The demographics of students have changed since 2008.

Methods

Demographic data from EMS students who opened accounts in Fisdap™, an internet-based administrative database, were retrospectively reviewed for students with the following criteria: student provided consent for research, reported age >15 years. Analyses were performed with Chi-Square tests.

Results

162,510 EMS students were included in the study. Regarding age and sex, there was a highly statistically significant change over time ($p < 0.0001$). 79.7% of students reported their sex; there was an increase of 0.32% and 23.6% in male and female students respectively. 26.6% of students reported their age; the population of students aged 18-24 increased, students aged 25-29 increased 0.29%, students aged 30-39 decreased 0.25% and students 40 and older increased 1.61%. Data for ethnicity was only captured for 2013-2014 and only 20% of students reported; there was an increase in population of 0.09% for African American, decrease of 0.06% for Asian, decrease 1.37% for Caucasian, increase 1.35% for Hispanic, and an increase of 0.25% for other.

Conclusion

While we may feel that we have made progress in becoming diverse, the changes, while statistically significant, are small. It was noted that with time, more students reported their age, ethnicity and sex. Future studies may more accurately describe the changing demographics. Further research should compare the demographics of incoming EMS students and those successfully completing programs, as well as the impact of regional or school-specific diversification initiatives on student population.