

TITLE: PRE AND POST-CLERKSHIP TESTS ARE GOOD INDICATORS OF MEDICAL STUDENT EDUCATION
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During the last few years, anesthesiology has become one of the most sought after career specialties for graduating medical students. As the number of medical students enrolling in elective anesthesia clerkships continues to grow, we, the anesthesia educators must improve and improvise in our efforts to give them a superior education. During the last 2 years, we have developed a written test (multiple choice format) given to the medical students both before and after their elective clerkship. We believe these tests have been useful not only in evaluating the education that the medical students have received during the clerkship but also in motivating them to excel during the clerkship.

METHODS: The 4 week anesthesia clerkship at our institution is an elective experience. The medical students take the clerkship either during their third year (M3) or early in their fourth year (M4). Both the pre and post-clerkship tests are randomly selected from the same 188 bank questions. These bank questions fall into the following categories: Pharmacology, toxicity and drug interactions - 12%, Pharmacokinetics - 10%, Applied physiology - 20%, Anesthetic safety - 13%, Anesthetic complications - 13%, Anesthetic techniques and decision making - 6%, Anesthetic apparatus - 4%, Applied anatomy - 9% and General medicine, acute medicine and resuscitation - 13%. Fifty questions are selected at random for each test and 60 minutes is allowed for the test. Only the post-test scores are counted towards the student's final grade. During the 4 week clerkship the students take part in the anesthetic management of

patients, attend didactic sessions (3-4 per week), and are encouraged to study from the selected texts supplied. At the end of the clerkship, in addition to the multiple choice written test, the students are also evaluated on their daily clinical performance, an oral test and a case write up.

RESULTS: During the last 22 months, 98 M3s and 61 M4s have rotated through this educational experience. The pretest scores for both M3's and the M4's were low ($37\% \pm 9\%$ and $40\% \pm 9\%$ respectively); as might be expected there was a trend for the M4s to have the higher score ($p=0.057$, ANOVA). The amount of improvement from the pretest to the post-test was substantial ($27\% \pm 11\%$ for M3s and $25\% \pm 12\%$ for M4s; $p \leq 0.0001$, paired t test) but not significantly different between the groups. Although it is believed that most students who have an interest in pursuing anesthesiology as a career schedule their anesthesia rotation for either late in their M3 year or early in their M4 year (generally June through September), there were no monthly or seasonal differences in pre or post-test scores or in the percent change in score.
DISCUSSION: The administration of a pretest on the first day of our anesthesia rotation may serve several purposes. First, it may clue students in on the type of information that they will be exposed to during their anesthesia rotation and it may direct their attention in the right direction when reading the supplied text books. Secondly, by pointing out to the students that there is a significant amount of knowledge to be learned (as evidenced by their relatively low scores on their pretest), the pretest may act as a motivator to complete the required reading, attend the didactic sessions and observe the actual operating room cases with an inquisitive attitude. Finally, being able to observe a significant improvement in their performance by the end of the rotation may give students a sense of accomplishment in and enthusiasm for anesthesia as a specialty.

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TITLE: DETERMINANTS OF OUTCOME FOLLOWING PNEUMONECTOMY
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Introduction: Morbidity and mortality following pneumonectomy remain common and often have been related to the perioperative administration of crystalloid solutions.¹ We hypothesized that increased morbidity following pneumonectomy might be related to increased blood flow through the remaining lung, but doubted that the intravenous administration of crystalloids would significantly alter this effect.

Methods: We retrospectively analyzed the preoperative evaluations and operative and postoperative courses of 68 patients (aged 55 ± 14 yrs, mean \pm SD, range 11 - 77; 75% male) who required pneumonectomy (40 left, 28 right; 24% were carinal or completion pneumonectomies) between 1986-89. Data examined included age, sex, arterial blood gas tensions, pulmonary function tests, and regional ventilation/perfusion scans. All had predicted postoperative FEV-1 > 800 ml. Anesthesia was induced with thiopental and maintained with enflurane or halothane and a nondepolarizing relaxant. Ventilation was controlled. Operative and first day fluids and fluid balance, arterial blood gas tensions, chest X-ray score, days of mechanical ventilation, ICU stay, postoperative hospitalization and outcome were recorded. Data were analyzed by Student's t-

test, Chi-square or discriminant analysis. A P value of < 0.05 was considered significant.

Results: Six patients (8.8%) died. Right-sided pneumonectomies had a much higher mortality (22 v. 0%, $P = 0.0022$). Survivors had decreased preoperative perfusion (22 ± 15 v. $45 \pm 15\%$, $P = 0.006$) and ventilation (28 ± 15 v. $49 \pm 9\%$, $P = 0.007$) to the operative lung. Four of 6 pts. (67%) with radiographic evidence of pulmonary edema by the 2nd postoperative day died v. 2 of 62 pts. (3%) with clear CXRs on postoperative days 1 and 2 ($P < 0.0001$). Perioperative fluids were administered in proportion to the estimated blood loss ($r = 0.83$, $P < 0.001$). Total intravenous fluids administered during the operation and the first postoperative day ranged from 1870 to 16643 ml (median 3519 ml). Total inputs minus total outputs during this time ranged from 275 to 8788 ml (median 2046 ml). Survival, development of pulmonary edema, and length of stay were not correlated with any feature of intra- or post-operative fluid management.

Discussion: Death was related to the side of operation, degree of preoperative perfusion to the operative lung, and the development of postoperative pulmonary edema. Respiratory failure and pulmonary edema usually developed within 2 days and were predictive of death. The amount and type of perioperative fluids administered appeared unrelated to outcome in our patients.

Reference:

1. Zeldin RA et al.: *J Thorac Cardiovasc Surg* 87: 359-365, 1984