Efficacy of Teaching Electrocardiography over a Full-Semester versus During a Short, Intensive Session

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Introduction

At the University of South Carolina Aiken (USCA) each Exercise and Sports Science (ESS) student is required to take our fundamental Electrocardiography (EKG) course. Electrocardiography follows Human Physiology and is a prerequisite course to Exercise Testing in the ESS course sequence.

The study of EKG consists of the analysis and interpretation of waveforms created by the heart's electrical system. This interpretation is necessary for physicians, nurses, and exercise physiologists to diagnose heart problems such as ischemia, dysrhythmias, and infarction. Following diagnosis, subsequent patient care decisions are made. In a work setting, the primary exposure of the exercise physiologist to EKG is through exercise testing and cardiac rehabilitation monitoring. Our course provides information on fundamental EKG interpretation as well as an emphasis on exercise electrocardiography. Success in the course requires memorization of criteria and application of these criteria to EKG pattern recognition.

At USCA, this course is offered during Spring semester and during Maymester. During Spring semester, EKG is taught for four months, three days per week, 50 minutes per session. The course ends in the middle of May. During Maymester, the course is taught for 2.5 weeks, five days per week, 3.5 hours per session. Maymester ends at the end of May. Exercise and Sports Science juniors are required to take EKG during one of the semesters prior to taking the Exercise Testing course in the Fall. Selection of Spring semester versus Maymester is the student's choice. As educators, we are interested in the magnitude of the student's initial learning of this material and in their retention under each of these course formats. A review of literature indicates that both mental and physical learning are influenced by session duration, session frequency, and total length of the instruction period (1,2,3).

The first objective of this investigation was to compare the initial performance of EKG interpretation in students taking Electrocardiography during Spring semester versus Maymester. The second objective was to measure and compare three month retention of the material learned under each of these course formats.

Methods

Subjects. Twenty one USCA ESS students elected to take the EKG course during Spring semester 2001 and 21 students elected to take the course during Maymester 2001. The Spring semester group (SG) and the Maymester group (MG) both signed informed

consent to voluntarily serve as study subjects. Grade confidentiality was maintained during the study and after investigation completion. The SG comprised 11 males and 10 females with a mean age of 23 and a pre-semester cumulative GPA of 2.67. The MG comprised 9 males and 12 females with a mean age of 22 and a pre-semester cumulative GPA of 2.69.

Instruction. The Principal Investigator of this study taught the two EKG courses. The material presented for the two courses was identical. The instructional format was primarily learner-centered. Following some lecturing, the instructor assisted students in interpretation of the electrocardiograms. Two Internet EKG websites (4,5) were frequently used to display examples and each class went on two short fieldtrips (USCA Wellness Center and the Aiken Regional Medical Center) for hands-on experience.

Examinations. Two 100 point examinations were administered throughout the courses and one partially cumulative 150 final examination was given at the end. Student grades were based on their percentage of the 350 possible points. The examinations used for the two courses were identical. The examinations were predominately objective, consisting of multiple choice questions and EKG interpretation. The retention examination was also primarily objective and was given to all 42 subjects in the Fall.

Data analysis. Since the data are parametric/interval, the Student t-test was used to determine probability levels for inter-group differences in mean values. Statistical significance was established at the $p<0.05$ level; all data are reported as mean scores.

Results and Discussion

Result of Examinations. The SG had a mean score of 75%, 80%, and 76% on examinations one, two, and three, respectively. The MG mean scores were 83%, 86%, and 81%, for the three examinations. The total course percentage score was 77% for the SG compared to 83% for the MG. Each SG mean score was significantly lower ($p<0.05$) compared with the corresponding mean score for the MG.

On the retention examination, the mean score for the SG was 53% and the mean score for the MG was 53%. The retention examination mean scores were not significantly different between groups ($p=0.79$).

Discussion. The principal finding of the investigation was that students taking EKG during Maymester performed better on examinations given during the course, but retained their knowledge at a level equal to their counterparts who took the course over a full-semester period.

Several plausible explanations exist to explain the heightened performance during the Maymester period. Students attended at a rate of 99% in Maymester versus an 85% rate during Spring semester. It is easier for a student to rationalize missing a 50 minute class compared to a 3.5 hour class. At USCA fewer distractions from courses occur

during Maymester. For example, athletic events and student activities (clubs, committees, and social functions) are virtually nonexistent during the Maymester period. During Maymester, the examinations occur at tighter intervals; thus fewer days go by between a lecture and an examination.

The finding of equal retention on the three month follow-up examination was inconsistent with the initial examination results. This suggests that long-term retention of EKG interpretation skills is independent of initial performance. Since long-term retention is the most important desired outcome in learning electrocardiography, the author concludes that this course may be taken during a full-length semester or during a short, intensive session with equal efficacy.

References

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