

ACLS Simulation Examination between Korean and American paramedic students

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I. Introduction

Prehospital care in South Korea is in its infancy. Paramedic training programs in Korea are intensive and are on similar levels as their US counterparts. Advanced Cardiac Life Support (ACLS) training such as ECG interpretation and advanced airway techniques are requirements in the curriculum of Korean paramedic training. In spite of this fact, Korean paramedics operate essentially as BLS crews with limited physician support, restricted protocols and lack essential medications that can be administered in the pre-hospital setting.

Korean paramedics are being underutilized. They are often discouraged to assess patients, perform procedures and provide medication until they reach a hospital setting. This can

be attributed to the belief that pre-hospital care is not an intervention that can be performed competently by non-physician personnel.

With the advent of the new American Heart Association (AHA) 2005 ACLS guidelines, there is a unique opportunity to introduce and evaluate an innovative simulation educational strategy for educating EMS providers¹⁾. Providing simulation of a scenario-based performance oriented team instruction method can empower paramedic students and strengthen the core skills which are necessary for prehospital care.

In the US, ACLS passing rates are high with near 90-100% pass rate. For those who fail initially, the remediation rate is also excellent. Of those students who do remediate, nearly all students pass. This can be attributed to the amount of repetition involved in coursework and megacode stations. We hope to show that Korean paramedic students can mirror these pass rates using simulation education modules.

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II. Methods

Korean paramedic students were taught current ACLS concepts and guidelines. They underwent the same rigorous ACLS lectures and hands on training as developed by the American Heart Association. We utilized Korean EMS student volunteers from the Cheju Halla University Paramedic program to attend an ACLS course taught by an accredited ACLS instructor from the United States and from South Korea.

The study subjects are currently enrolled in a paramedic training program where ACLS concepts are integrated early into their core curriculum. Instructions were given to review the updated ACLS material for approximately one week prior to the ACLS training courses. All concepts of the current ACLS guidelines were taught in this group at the "bedside". Students were grouped into teams of five students and each student had the opportunity to rotate through different aspects of pre-hospital care such as management of the airway, chest compressions, intravenous access, medication usage and finally as the "megacode" leader²⁾.

The three groups were randomized into three case scenarios. In case one, the status asthmaticus case; there were three critical actions. First, recognition of failed airway, performing the rapid sequence intubation (RSI) and post-intubation management. They were tested the medications and dosages of medication for RSI. First case, total score of 15 was given if group performed all three critical actions on time.

This was followed by second case of cardiac arrest with megacode scenarios; rhythm recognition, a procedures station and lastly scenario based team instruction. Each group was introduced to each ACLS teaching case, ventricular dysrhythmias, bradycardia, acute coronary syndrome, ventricular tachycardia/fibrillation and PEA. The instructor introduced each case by providing an example of how these "code" situations are executed in a pre-hospital setting. Then each student had an opportunity to become a team leader and delegate roles for his team members which included, airway, intravenous access and compressions.

In the cardiac arrest megacode, there were four critical actions that must be met to pass the case²⁾. They were recognition of acute myocardial infarct (AMI) with appropriate medical treatment, recognition of ventricular fibrillation with ACLS care, recognition of PEA with ACLS care and recognition of cardiogenic shock with medical therapy³⁾. For the second case, total of 20 points were given if executed all four critical actions on time.

Finally, the third case involved the chronic obstructive pulmonary disease (COPD) with tension pneumothorax in which there were 2 critical actions. First critical action was treat COPD with medical therapy and second critical action involved recognition of tension pneumothorax with acute treatment decompression⁴⁾. Total of 10 points were given if performed perfectly on time.

1. Participant Inclusion/Exclusion Criteria

Each arm of the study had a maximum of

five students and these students were randomized accordingly. The requirements for entering this study would be that the participants must be students matriculated into the three year paramedic training program at Cheju Halla College. In addition all students must have taken courses in cardiology and ACLS concepts. The study would be open to students from first through third year provided that they meet these requirements.

III. Study Testing Procedures

Students were tested in a private room by a single evaluator. The cameras were located from a vantage point from which a reviewer can adequately evaluate the required skills, including airway opening, assessment of breathing, signs of circulation, compression rates and defibrillation.

We used an objective checklist specifically for the videotaped portions of the megacode examinations for the evaluators. A series of three different megacode scenarios were chosen randomly to test each student. The students had to master 70% of these core skills to pass the megacode examination.

The single evaluator than compare the scores with the paramedic students from USA performed in a similar manner at Flushing Hospital Medical Center, Queens in New York.

IV. Results

A total of fifteen second year Korean paramedic students were enrolled and all

fifteen students passed testing. Three cases including the ACLS megacode testing requires each student to master 70% of the core skills in order to pass the examination. In Asthma case, group 1 (G1K) scored 11/15 (73%), group 2 (G2K) scored 14/15 (93%) and group 3 (G3K) scored 12/15 (80%). In cardiac arrest case involving megacode, group 1 (G1K) scored 14/20 (70%), group 2 (G2K) scored 19/20 (95%) and group 3 (G3K) scored 15/20 (75%). In COPD with tension pneumothorax case, group 1 (G1K) scored 7/10 (70%), group 2 (G2K) scored 9/10 (90%) and group 3 (G3K) scored 8/10 (80%).

In all three cases, group 2 (G2K) scored the highest, scoring total of 42/45 (93%).

For the American group, in asthma case, group 1 (G1U) scored 12/15 (80%). Group 2 (G2U) scored 12/15 (80%) and group 3 (G3U) scored 13/15 (87%). In cardiac arrest case, group 1 (G1U) scored 15/20 (75%), group 2 (G2U) scored 16/20 (80%) and group 3 (G3U) scored 15/20 (75%). In COPD with tension pneumothorax case, group 1 (G1U) scored 7/10 (70%), group 2 (G2U) also scored 7/10 (70%) and group 3 (G3U) scored 8/10 (80%). All three group from USA paramedics passed the cases.

V. Discussion

In this comparison study there was no difference in pass rates between Korean American paramedic students. Our study showed that paramedic students from USA scored more uniformly than students from Korea in all three cases. Even though the students were

randomized into three groups, we observed one of the group (G2K) showed superiority over other groups from Korea.

Although, the Korean paramedic curriculum includes all aspects of ACLS, currently there is no ACLS requirement for Korean paramedics. This can be partly attributed to the fact that current ACLS certification is based entirely on US AHA standards including the written pre and post tests and megacode examinations⁵⁾. Empowering paramedics early in their training can be instrumental in the development of prehospital care in South Korea⁶⁾. To increase cardiopulmonary arrest survival, the American Heart Association developed basic and advanced cardiac life support (ACLS) courses that expose participants to realistic learning situations^{7,8)}.

In this small study, we found that paramedic students from Korea performed similar to students from USA using the simulation cases. The use of simulation technology has great potential to shape paramedic medical education, certification, and the quality of care in Korea.

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=국문초록=

한국과 미국 응급구조 학생간에 전문심장구조술 시뮬레이션 시험

(ACLS Simulation Examination between Korean and American Paramedic students)

Christopher C. Lee* · 김태민**

서론(Introduction) : 의학 시뮬레이션(medical simulation)은 교육생 학습과정에서 내재된 위험이 환자에게 가해짐 없이 교육생이 실제적인 환자 상황을 경험할 수 있게 하고 여러 다양한 임상내용이 포함된 상황에 적용될 수 있다. 시뮬레이션 기술의 사용은 의학교육(medical education), 인증서(certification), 면허교부(Licensure)와 의료의 질 형성에 큰 잠재력을 가지고 있다. 복강경 수술, 내시경검사, 전문심장구조술, 응급기도관리와 외상소생을 포함한 다양한 임상기술의 수행에서 시뮬레이션이 교육생의 술기를 달성하고, 측정하고, 유지하는 유효성을 증명하였다 컴퓨터로 조절되는 시뮬레이터는 맥박, 혈압, 호흡, 대화가 가능하고, 중증질환 또는 외상환자의 치료에 필요한 같은 인명구조 기술을 수행할 수 있다. 의학 시뮬레이션은 의사, 간호사, 응급구조사와 응급 진료를 필요로 하는 환자를 치료하는 사람에게 필요하다.

최신 전문심장구조술 과정수업은 전통적인 강의와 제한된 팀 상호작용이 포함된 이들 과정이다. 우리는 비 영어권 국제 응급구조학생의 전문심장구조술 술기능력을 알아보고, 그것을 미국 응급구조학생과 비교하고자 한다.

목적(Objective) : 이 연구의 목적은 다양한 전문심장구조술 증례 시나리오를 가진 의학 시뮬레이터를 이용하여 미국과 한국의 응급구조 학생의 능력을 비교하는 것이다.

시험 장소(Site Location) : 이 연구는 한국 제주도에 위치한 제주한라대학 스토니브룩 응급의료교육원에서 진행되었다. 학생들의 평가는 스토니브룩에 위치한 스토니브룩 대학 의료원의 한 명의 평가자(Dr. lee)에 의해 수행되었다.

방법(Methods) : 15명의 한국 응급구조학생들은 세 팀으로 무작위로 선정하였다. 5명이 한 팀이 되어 같은 증례의 시나리오를 받았다. 세 가지 시나리오는 : 첫째, 천식지속상태(Status asthmaticus), 둘째, 긴장기흉을 동반한 만성폐쇄성폐질환(COPD with tension pneumothorax) 그리고 마지막으로 메가코드(megacode)를 가진 심정지이다. 세 팀을 각각 그리고 기본인명구조술(BLS)과 전문심장구조술(ACLS)과정을 마친 미국 응급구조학생들과 비교하였다.

15명의 미국 응급구조학생들 또한 세 팀으로 무작위로 선정하였다. 이 응급구조 학생들은 플러싱병원 의료원 소속으로 그곳에서 이 연구에 참여할 뿐만 아니라 지속적인 의학교육(CME)이수를 받았다. 이들에게도 같은 세 가지 증례의 시나리오가 주어졌고 Dr lee는 총 여섯 팀을 평가하였다(한국 세 팀과 미국 세팀).

결과(Results) : 양 국가의 모든 15명의 학생이 의학시뮬레이터를 사용하여 전문심장구조술 메가코드 시험을 포함한 시험에 모두 통과하였다. 비록 학생들을 무작위로 세 팀으로 나누었지만 한 팀이 이 모든 세 증례에서 다른 팀보다 뛰어났다. 제주한라대학 2번 팀은 더 나은 기도관리, 리듬인식과 임상술기를 가진 모든 중요한 활동을 얻기에서 우수했다. 그들은 핵심요구사항을 90% 이상 충족시켰다. 한국의 2번 팀(G2K)은 메가코드에서 기도개방, 호흡평가, 순환징후 그리고 흉부압박수와 같은 신체검진 술기에서도 탁월했다. 게다가 다른 팀과 비교 시 리듬인식, 약물지식과 임상술기에서도 높은 점수를 받았으며 2번팀(G2K)이 6팀 중에 가장 뛰어나게 역할수행을 하였다.

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결론(Conclusion) : 이 비교 연구에서 한국학생과 미국학생간에 전문심장구조술 메가코드 시험의 통과율에는 차이가 없었다. 그러나 미국학생은 세 팀 사이에 더 적은 번이로 더 일괄된 점수를 받았다. 한국학생들도 모든 세 가지 증례를 통과하였지만 이 세 팀은 미국학생 팀보다 점수에서 더 큰 변이를 보였다.

Key Words : 전문심장구조술 시험, 응급구조과학생, 의학시뮬레이터