

# Ability of the Medical Students to Triage Multi-casualty Situations

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## Abstract

**Objective:**Advanced Trauma Life Support (ATLS®) course is routinely taught to the students in medical schools. While the ATLS® training improves the ability of medical students to prioritize and manage individual patients<sup>1</sup>, data is lacking on the application of ATLS® principles in a multi-casualty incident. The aim of this paper is to analyze the effect of ATLS® training principles on medical students' ability to effectively triage mass casualty scenarios.**Materials and Methods:**A total of 103 medical students participated in the study. A pre-ATLS lecture test and a post-ATLS lecture test were designed containing three scenarios of five patients each directly related to different components of ATLS® training. Students were asked to rank patients in order of priority from 1 to 5.**Data:**Comparison of data showed a significantly higher score in post-lecture test than pre-lecture test (73.3% vs. 37.8%). No correlation was noticed between any completed core rotation and BLS/ALS courses by the students and their triage scores.**Conclusion:**We found in this paper that teaching ATLS® principles to medical students improved the ability of medical students to effectively triage mass casualty patients. We also found that the students are easily distracted if a child or a pregnant woman is included in the test scenario and core rotations have no significant impact on the triage scores.

## INTRODUCTION

Triage is defined as the sorting of and allocation of treatment to patients according to a system of priorities designed to maximize the number of survivors<sup>2</sup>. It is especially useful in mass casualty situations, when the number of victims is greater than the amount of resources. Until recently, the United States has been relatively inexperienced in mass casualty triage with notable exceptions including the World Trade Center bombing in 1993, the Oklahoma City bombing in 1995, the Centennial Olympic bombing in 1996, and the destruction of the World Trade Center in 2001. Terrorist attacks have become increasingly frequent over this past decade, and it is imperative that our nation's healthcare professionals, both current and future, are sufficiently trained to triage severely injured patients<sup>3</sup>. The timely determination of patient priority has not been taught in standard curriculum; rather, it is an application of knowledge learned under different settings. There are two types of triage: triage of an individual patient and multicasualty triage. Individual patient triage is well represented in training programs (START®, etc.), whereas multicasualty triage methods comprise only a small portion of Advanced Trauma Life Support® (ATLS®) training.

## MATERIALS AND METHODS

A total of 103 medical students participated in the study. Before the lecture in ATLS® principles, the students were introduced to the objective of triage: to maximize the number of survivors by treating the greatest life-threatening injuries first. The students were then informed that the purpose of the study was to analyze the effectiveness of the training by conducting a pre-lecture and a post-lecture test. The students were also asked to fill out a questionnaire which included questions about the following:

- Age and gender
- Core/elective clerkships completed
- Specific prior experience in the health care field
- Prehospital Trauma Life Support, Basic Life Support, or Advanced Life Support® training and the year completed

The pre-lecture test consisted of three multiple casualty scenarios (identified by numbers 1-3) consisting of five patients in each scenario, with various injuries directly

relating to the primary survey portion of the ATLS®: one with an Airway problem, one with a Breathing problem, one with a Circulation problem, one with a Disability injury, and one with an Extremity issue. The first scenario was composed of five adults of either gender, the second scenario included a child, and the third scenario included a pregnant woman and a child. The students were asked to rank the patients in order of priority from 1 to 5, with “1” being the patient in greatest need of medical assistance and “5” being the patient with the least need for medical assistance. After the pre-lecture test, the students attended a lecture on ATLS® principles. Three weeks after the lecture, 30 students took the post-lecture test. The post-lecture test consisted of the exact same scenarios and patients as the pre-lecture test, and the students were given the exact same instructions regarding rank order.

**DATA**

The students were graded on how well they performed triage correctly according to the ATLS® principles. Two methods were used to assess the test results. Using the first method, the entire sequence of all five patients in each scenario had to be ranked correctly by the student in order to receive a point, with a maximum score of three. Using the second method, we assigned the student one point for ranking only the first patient correctly in each scenario, also with a maximum score of three.

**METHOD 1**

**PRE-LECTURE TEST DATA**

We found that 39 out of 103 students (37.8%) ranked one out of the three scenarios correctly in the pre-lecture test. None of the students ranked more than one scenario correctly. Thirty seven students (37/103; 36%) ranked the first scenario correctly which involved five adult patients of either gender, one student (1/103) ranked the second scenario correctly which included a child in the set of five patients, and one student (1/103) ranked the third scenario correctly which included a pregnant woman and a child correctly. Sixty four students (64/103; 62%) did not rank any scenario correctly.

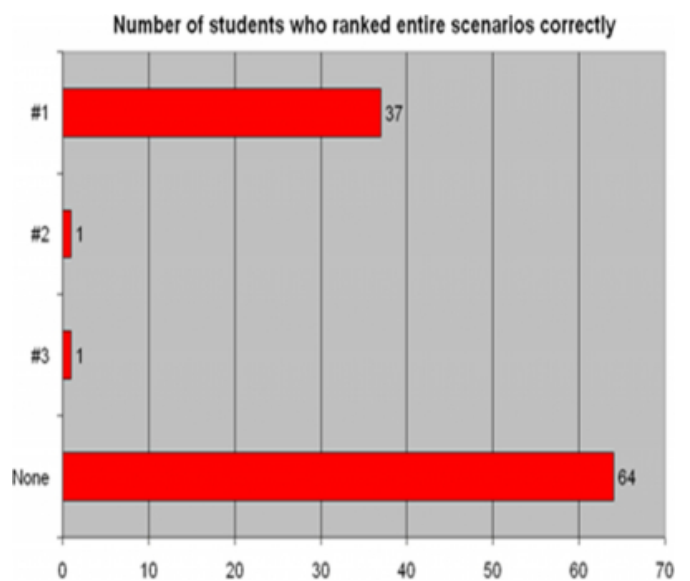
**POST-LECTURE TEST DATA**

Three weeks after the ATLS® lecture, we found that twenty two out of thirty students (22/30; 73.3%) ranked at least one scenario correctly. Six students (6/30; 20%) were able to rank two scenarios correctly and one student (1/30; 3.3%) ranked all three scenarios correctly. A total of twenty students (20/30; 66.6%) ranked the first scenario correctly

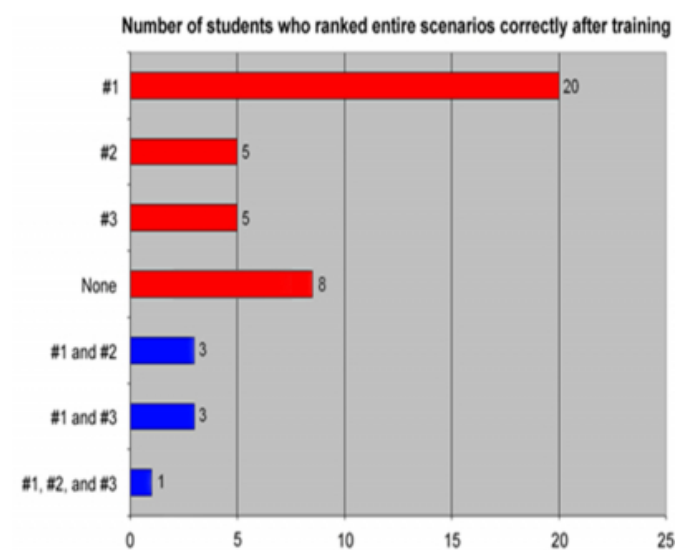
involving adult patients of either gender, a total of five students (5/30; 16.6%) ranked the second scenario correctly which included a pediatric patient, and a total of five students (5/30; 16.6%) ranked the third scenario correctly which included a pregnant woman and a child. Three students (3/30; 10%) ranked the first and second scenarios correctly and three students (3/30; 10%) ranked the first and third scenarios correctly. Eight students (8/30; 26.6%) did not rank any scenario correctly.

**METHOD 1: PRE-LECTURE AND POST-LECTURE TEST DATA**

**Figure 1**



**Figure 2**



**METHOD 2**

**PRE-LECTURE TEST DATA**

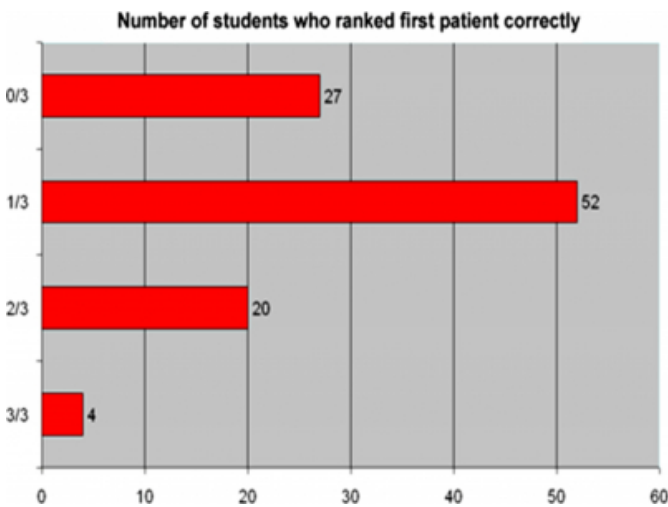
Using the second method of grading the students we found that fifty two students (52/103; 50.4%) ranked the first patient of one scenario correctly, twenty students (20/103; 19.4%) ranked the first patient of two scenarios correctly, and four students (4/103; 3.8%) ranked the first patient of all three scenarios correctly. Twenty seven students (27/103; 26.2%) did not rank the first patient in any of the three scenarios correctly.

**POST-LECTURE TEST DATA**

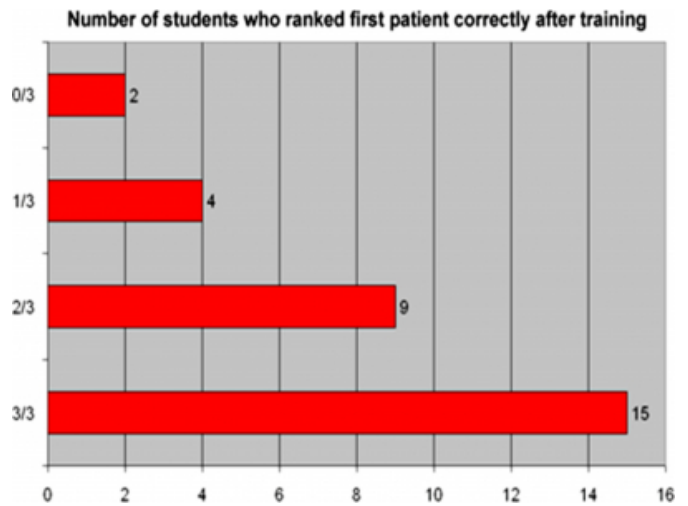
Using the second method of grading the students we found that four students (4/30; 13.3%) ranked the first patient of one scenario correctly, nine students (9/30; 30%) ranked the first patient of two scenarios correctly and fifteen students (15/30; 50%) ranked the first patient of all three scenarios correctly. Two students (2/30; 6.6%) did not rank the first patient in any of the three scenarios correctly.

**METHOD 2: PRE-LECTURE AND POST-LECTURE TEST DATA**

**Figure 3**

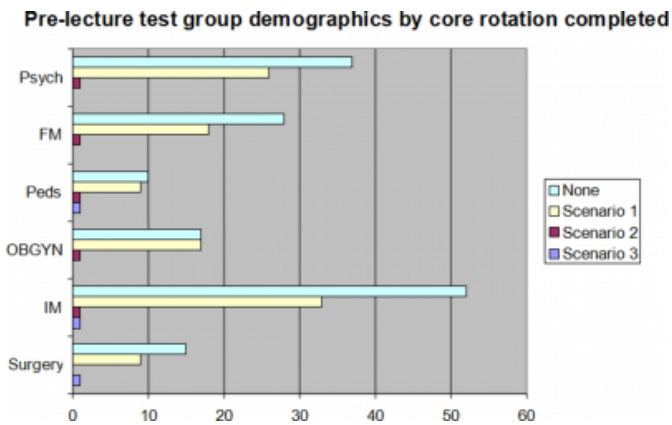


**Figure 4**



Most but not all of the students completed the optional questionnaire. The pre-lecture test groups' ages ranged from 16-47 (16 year old med student?), with 55 males and 48 females. Of the twenty five students (25/103; 24.2%) who completed the surgical clerkship at the time of pre-test, nine students (9/25; 36%) ranked the first scenario correctly and one student (1/25; 4%) ranked the third scenario correctly. Of the eighty seven students (87/103; 84.4%) who completed the Internal Medicine clerkship, thirty three students (33/87; 38%) ranked the first scenario correctly, one student (1/87; 1.1%) ranked the second scenario correctly, and one student (1/87; 1.1%) ranked the third scenario correctly. Of the thirty six students (36/103; 35%) who completed the Obstetrics and Gynecology rotation, seventeen students (17/36; 47.2%) ranked the first scenario correctly, and one student (1/36; 2.7%) ranked the second scenario correctly. Of the twenty one students (21/103; 20.3%) who completed the Pediatrics rotation, nine students (9/21; 42.8%) ranked the first scenario correctly, one student (1/21; 4.7%) ranked the second scenario correctly, and one student (1/21; 4.7%) ranked the third scenario correctly. Of the forty seven students (47/103; 45.6%) who completed the Family Medicine clerkship, eighteen students (18/47; 38.2%) ranked the first scenario correctly and one student (1/47; 2.1%) ranked the second scenario correctly. Of the sixty four students (64/103; 62.1%) who completed the Psychiatry rotation, twenty six students (26/64; 40.6%) ranked the first scenario correctly and one student (1/64; 1.5%) ranked the second scenario correctly. In summation, there was no correlation between any completed core rotations and observed triage scores.

Figure 5



Of the fifty five ALS certified students (55/103; 53.4%), twenty one students (21/55; 38.1%) ranked the first scenario correctly, one student (1/55; 1.8%) ranked the second scenario correctly, and one student (1/55; 1.8%) ranked the third scenario correctly. Of the seventy three BLS certified students (73/103; 70.8%), twenty seven students (27/73; 37%) ranked the first scenario correctly, one subject (1/73; 1.3%) ranked the second scenario correctly, and one student (1/73; 1.3%) ranked the third scenario correctly. In summation, there was no correlation between the completion of ALS or BLS training and the observed triage scores.

Figure 6

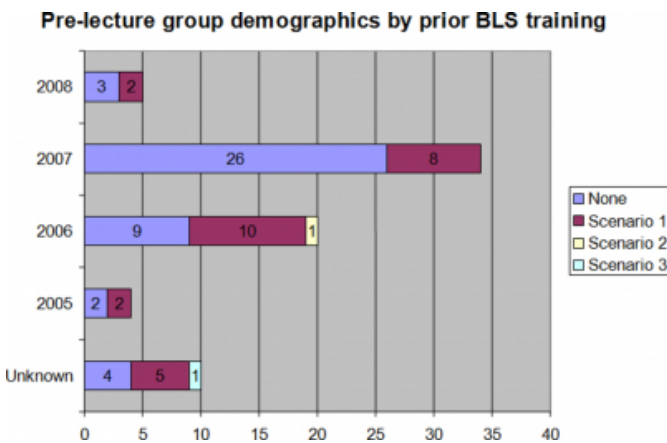
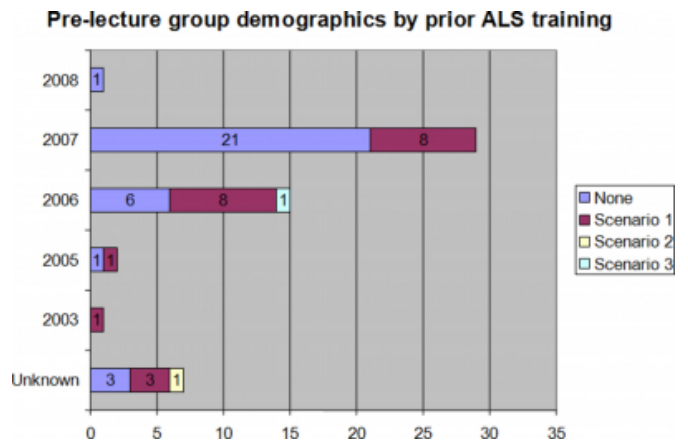


Figure 7

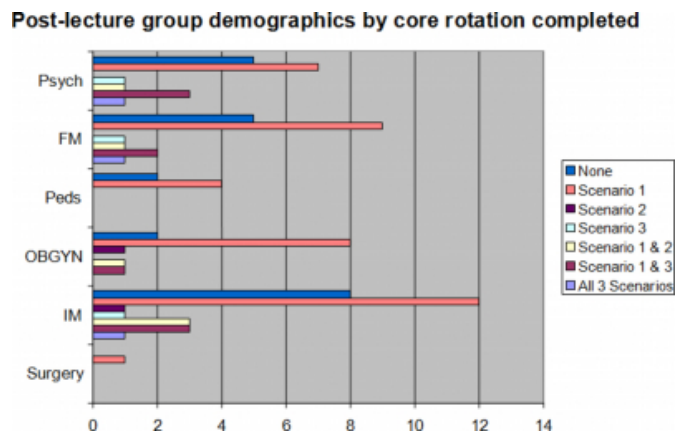


The post-lecture test group consisted of the students we tested three weeks after the ATLS® lecture. Their ages ranged from 23-38, with 17 males and 13 females. The following table outlines the number of scenarios each student ranked correctly organized by rotation completed.

Figure 8

Rotation Completed	Scenario ranked correctly						
	#1	#2	#3	#1 & #2	#1 & #3	All 3	None
Surgery	1	0	0	0	0	0	0
Internal Medicine	12	1	1	3	3	1	8
OBGYN	8	1	0	1	1	0	2
Pediatrics	4	0	0	0	0	0	2
Family Medicine	9	0	1	1	2	1	5
Psychiatry	7	0	1	1	3	1	5

Figure 9



Twenty students (20/30; 66.6%) had prior BLS training and sixteen students (16/30; 53.3%) had prior ALS training. The following graphs summarize the scenarios the students ranked correctly organized by the year of BLS and ALS training respectively.

Figure 10

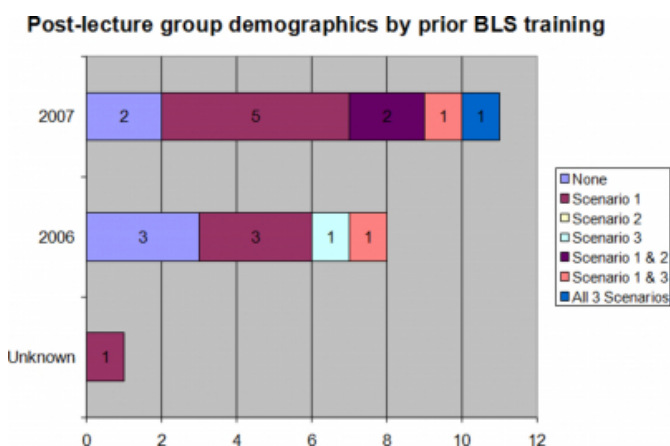
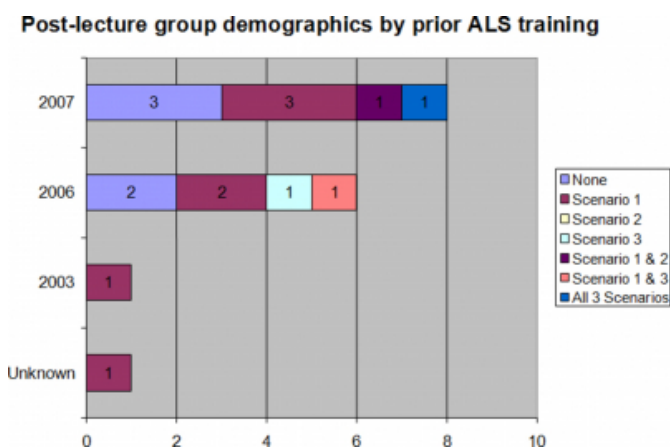


Figure 11



**DISCUSSION**

Based on these results, we found that multicasualty trauma triage is a learned skill and standard education did not appear to have any significant effect on the medical students' ability to triage a multicasualty situation. This statement is supported by the fact that only three students (3/103; 2.9%) were able to identify the first patient accurately in all three scenarios on the pre-lecture test. After the ATLS® lecture, fifteen students (15/30; 50%) were able to identify the first patient accurately in all three scenarios. Only thirty nine out of one hundred and three students (39/103; 37.8%) were able to rank at least one entire scenario correctly on the pre-lecture test, as compared to twenty two out of thirty students (22/30; 73.3%) after the ATLS® lecture. Prior ALS or BLS training did not appear to have a significant effect on the students' scores, with 40 % (ALS) and 39.7 % (BLS) of the students ranking at least one scenario correctly on the pre-lecture test. 40% of the students who completed Surgery rotation, 40.2% of the students who completed Internal

Medicine rotation, 50% of the students who completed Obstetrics & Gynecology rotation, 52% of the students who completed Pediatrics rotation, 40.4% of the students who completed Family Medicine rotation, and 42.2% of the students who completed Psychiatry rotation ranked at least one scenario correctly, which led to the conclusion that the completion of specific core clerkships appeared to have an insignificant effect on the students' pre-lecture test scores. We also noted that the students appeared to be easily distracted if the scenario included a pregnant woman or a child. Of the thirty nine students (39/103; 37.8%) who ranked one entire scenario correctly on the pre-lecture test, thirty seven students (37/39; 94.8%) ranked the first scenario, which included five adult patients of either gender, according to ATLS® principles. One student (1/39; 2.5%) ranked the second scenario correctly which included a pediatric patient and one student (1/39; 2.5%) ranked the third scenario correctly which included a pregnant woman and a child. The post-lecture test results showed that a total of twenty students (20/30; 66.6%) ranked the first scenario correctly, a total of six students (6/30; 20%) ranked the second scenario correctly, and a total of six students (6/30; 20%) ranked the third scenario correctly. It appears that more training is necessary to emphasize the importance of ranking patients by severity of injury. Based on our results, we concluded that ATLS® training is indeed effective on improving the students' multicasualty triage abilities. More data and follow-up evaluation is needed to clarify the amount and duration of formal training required. However, a standardized educational program should be implemented to teach medical students how to effectively prioritize patients. At the very least, the section on multicasualty triage within the ATLS® program should be expanded.

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