

## Satisfaction evaluation for ACLS training

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**Abstract:** *Background and aim of the work:* simulation became gradually pivotal in training of health professionals: indeed, it showed an improvement in practical skill of the trainees compared to theoretical lectures. Among others, ACLS (Advance Cardiovascular Life Support) courses are now one of the standard learning practices most spread around the world. The primary aim of this study is to evaluate both the level of satisfaction and the clinical thinking that the trainees perceived during an ACLS course. This was performed via the Satisfaction with Simulation Experience scale validated scale (SSE). The secondary aim was to evaluate if demographics affect the aforementioned perceived satisfaction. *Methods:* an SSE questionnaire was distributed after the ACLS section of practical scenarios, just before the end of the course and of the practical test. *Results:* 72 questionnaires have been collected. The sample was constituted by 68.1% of females, 44.4% by nurses without a master's degree, and 52.8% personnel that works outside of a critical care setting. QTOT Median score was 89 (IQR=86-90), DTOT Median's 45 (IQR= 44.25-45), RTOT Median's 25 (IQR=22-25), LTOT Median was 20 (IQR=19-20). *Conclusions:* The ACLS course attains a high grade of satisfaction on all of the three aspects evaluated by the questionnaire. The perception was not influenced by the demographics.

**Key words:** advanced cardiac life support, SSE, personal satisfaction, critical care, simulation training

### Background

In the latest edition of Audio-visual Methods in Teaching (1969), Dale sorted the learning experiences into three categories: enactive (i.e., learning by doing), iconic (i.e., learning through observation), and symbolic experience (i.e., learning through abstraction) (1). Some of the studies showed that passive learning does not allow to learn more than 20-30% while, active learning, or simulation, allows to reach a learning of up to 90% (2).

The simulation, as an educational strategy (3) consists in deployment of a real-life scenario, as realistic as possible, to teach specific skills and evaluate some procedures that require a high degree of accuracy

and sensitivity (2,4). It provides advantages both for the trainees, as an authentic and clinically relevant opportunity to engage in experiential learning, and for the instructor as well, as a safe environment conducive to learning without fear of personal failure or compromising client welfare (4,5,6,7).

Competent practice requires, not only psychomotor skills and knowledge, but also sophisticated thinking abilities (4,8,9) and simulations promote learning through understanding instead of memorizing facts and principles; they definitely do not replace real clinical experience, but give the trainee skills that could be applied directly to clinical practice (6,7,10) and can also result in gaining increased self-confidence and improved clinical judgement (11). Furthermore, the use

of self-reflection in clinical situations has the potential to promote adjustment, followed by collective discussion and/or education if cognitive errors occur (5,6), improving further learners' skills.

Simulations should be considered as an educational strategy that could be used to prepare students (4,7), and clinicians as well, who are unfamiliar with new clinical practice areas (5,6,112). The literature pointed out the potential role of simulation to bridge the theory-practice gap that is seen in healthcare education (3,4,7,13).

Several factors influence the effectiveness of a simulation and one of them is the student satisfaction, that may significantly affect performance (8).

The grade of commitment, and more specifically, faculty-student interaction and peer-to-peer interaction are significantly related to satisfaction (14,15).

The Advanced Cardiovascular Life Support (ACLS) is a course developed by the American Heart Association for healthcare professionals who either coordinate or participate in the management of cardiopulmonary arrest or other cardiovascular emergencies, assessing teamwork. Part of the course includes a practical simulation of the scenarios, in particular, the course takes 16 hours, spread over 2 days. In order to obtain the certificate, the learners have to:

- demonstrate that they are able to manage airways.
- provide optimal BLS (Basic Life Support).
- pass a written test concerning the theoretical part of resuscitation
- pass a practice test that consists in a megacode. In this situation the learner must sequentially manage various scenarios of cardiovascular emergencies (16).

Advanced Cardiovascular Life Support has a strong impact on patients' outcome (17,18).

Our study aims to evaluate nurses' interest, utility and satisfaction during an Advanced Cardiovascular Life Support course and if it is influenced by demographics or previous experiences of the learners; considering that satisfaction may affect both the performance (8) and learning, we could assess whether it is necessary and how to improve or modify the course,

depending on the characteristic of the attending students, or if the course is suitable for every health professional at each level of experience. The training became an important aspect of emergency preparedness for medical and nurse professionals(4)but also for non-professionals (19). The preparedness of emergency become an important public health issue after Covid outbreak (6,20) for the important impact on National health system (21).

## Methods

### *Study design*

This is a cross sectional study. The study was conducted according to the principles of the Helsinki declaration and was approved by the Italian Society of Medicine and Scientific Divulcation (SIMED, Società Italiana di Medicina e Divulgazione Scientifica) council in July 2021.

### *Instruments*

For the current study Italian version of Satisfaction with Simulation Experience scale (SSE)was used (2). SSE was developed by Levett-Jones et al. in 2011 to measure namely learners' satisfaction in simulation experiences and it consists in 18 items, evaluated via a 5-point Likert scale (Strongly disagree - disagree - not sure - agree - completely agree),the higher possible score is 90 the lower one 0(2,8); factor analysis highlighted three different dimensions, evaluated through three different subscales:

- the "Debriefing and reflection" subscale, made up by 9 items (total subscale score can range from 0 to 45), points out the validity and importance of the debriefing moments (e.g.,I had the opportunity to reflect on and discuss my performance during the debriefing).
- the "Clinical rationale" one, comprising 5 items (0 to 25 points),evaluates the effectiveness of the simulation concerning clinical thinking (e.g.,The simulation developed my clinical reasoning skills).

- the “Clinical learning” one, consisting of 4 items (0 to 20 points), evaluates whether clinical skills have been acquired or not (e.g., The simulation tested my clinical ability) (8).

### *Selection of participants*

This is a study conducted on 72 nurses (reached sample) attending ACLS course in the context of a master’s degree in Critical Care at the University of Parma; they were recruited during the first day of ACLS course. The learners came from different work environments: medicine ward, surgical ward, Emergency Department (ED), intensive critical care unit (ICU); we grouped them depending on whether they work in a Critical Care Unit or not; the other parameters we recorded were also their sex; for how long they have worked, and their educational level (degree in nursing or master’s degree). We gave them printed questionnaires (Italian Version of SSE) at the end of the megacode section, before both written and practical tests, during the ACLS course; the questionnaire was anonymous and wasn’t checked by the instructor until the very end of the course, to avoid that the fear of the outcome could distort the answers.

### *Statistical analysis*

We analyzed the answers and recorded them on an excel file as numerical variables: for the disagreeing answers we defined the score ‘1’, while for the major agreeing score we set ‘5’.

We calculated both the total score of the SSE (QTOT) and every subscale score as well: Debriefing and Reflection (DTOT), Clinical Rationale (CTOT), Clinical Learning (LTOT).

The categorical variables are presented as numbers, while the continuous variables are presented as median and interquartile range (IQR). Continuous variables were tested for normality by means of the Kolmogorov–Smirnov test and the appropriate analysis for unpaired data was applied. Data regarding QTOT, DTOT, CTOT and LTOT were found not to be normally distributed. Differences between medians were assessed by means of Mann–Whitney U Test.

Differences were considered significant when  $p < 0.05$ , otherwise they were considered non-significant (NS). The Prism 8.0.1 was the statistical software (GraphPad Software LLC, San Diego, CA, USA) we deployed.

## **Results**

Our sample consisted of 72 nurses, 49 females (68.1%) and 23 males (31.9%); 32 of them (44.4%) had a nursing degree, 40 a master’s degree (55.6%); 34 worked in a Critical Care ward (47.2%), 38 didn’t (52.8%) as shown in table 1. Table 2 shows the sample median age of 27 years old (IQR = 25–29). QTOT Median was 89 (IQR=86–90), DTOT Median’s 45 (IQR= 44.25–45), RTOT Median’s 25 (IQR=22–25), LTOT Median was 20 (IQR=19–20).

As highlighted in table 3, considering nurses who worked and didn’t work in Critical Care ward we found that the distributions of the two groups didn’t differ significantly in QTOT (respective Medians 89.5 vs 89) [(N Critical Care=34, N Non-Critical Care=38) U = 645.0, P 0.990], in DTOT (respective Medians 45 vs 45) [(N Critical Care=34, N Non-Critical Care=38) U = 589.0, P=0.398], in RTOT (respective Medians 25 vs 24.5) [(N Critical Care=34, N Non-Critical Care=38) U = 705.0, P= 0.467] and in LTOT (respective Medians 20 vs 20) [(N Critical Care=34, N Non-Critical Care=38) U = 644.5, P=0.983]. Considering male and female, the distributions of the two groups didn’t differ significantly in QTOT (respective Medians 90 vs 89) [(N Male = 23, N Female = 49) U = 572.5, P=0.908], in DTOT (respective Medians 45 vs 45) [(N Male = 23, N Female = 49) U = 554.0, P=0.880], in RTOT (respective Medians 25 vs 25) [(N Male = 23, N Female = 49) = 537.5, P=0.732] and in LTOT (respective Medians 20 vs 20) [(N Male = 23, N Female = 49) U = 531.5, P=0.630]. Considering who obtained a master’s degree and who hasn’t, the distribution in the two groups didn’t differ significantly in QTOT (respective Medians 89.5 vs 89) [(N Master Degree = 40, N No Master Degree = 32) U = 693.0, P=0.522], in DTOT (respective Medians 45 vs 45) [(N Master Degree = 40, N No Master Degree = 32) U = 684.0, P=0.512], in RTOT (respective Medians 25 vs 24.5)

**Table 1:** demographic characteristics of participants.

	FREQUENCY	PROPORTION
<b>DEGREE</b>		
NURSING	32	44,4
MASTER	40	55,6
<b>GENDER</b>		
FEMALE	49	68,1
MALE	23	31,9
<b>CRITICAL CARE</b>		
NO	38	52,8
YES	34	47,2

**Table 2:** the median age and the interquartile range of the sample.

COUNT	MEDIAN	IQR
72	27	25-29

**Table 3:** results of the Mann-Whitney U Test checking the influence of Critical Care work, Education and Gender on the SSE Subscales composite scores. QTOT is the total score of the SSE; DTOT is the Debriefing and Reflection subscale score, CTOT is Clinical Rationale subscale score and LTOT is the Clinical Learning one.

<b>MANN-WITHNEY U TEST</b>		
	U	SIGN.
<b>CRITICAL CARE WARD</b>		
DTOT	589.0	0.398
RTOT	705.0	0.467
LTOT	644.5	0.983
QTOT	645.0	0.990
<b>DEGREE</b>		
DTOT	684.0	0.512
RTOT	723.5	0.301
LTOT	718.5	0.267
QTOT	693.0	0.522
<b>GENDER</b>		
DTOT	554.0	0.880
RTOT	537.5	0.732
LTOT	531.5	0.630
QTOT	572.5	0.908

[(N Master Degree = 40, N No Master Degree = 32) U = 723.5, P=0.301] and in LTOT (respective Medians 20 vs 20) [(N Master Degree = 40, N No Master Degree = 32) U = 718.5, P = 0.267].

As shown in table 4, most nurses scored the highest value (5) on the Likert scale questions regarding the three different dimensions of the SSE Scale. 88.27% of scores in the DTOT dimension, 73.89% of the RTOT dimension and 82.29% of the LTOT dimension.

## Conclusions

Advanced Cardiovascular Life Support course significantly improves patient's outcomes (18); the clinical expertise of health professionals trained in Advanced Cardiovascular Life Support, performing medical care activity on cardiovascular arrest scenarios, is significantly associated with higher survival-to-discharge rates (22); the introduction of an ACLS-provider course was also associated with outcome improvement in immediate resuscitation (23).

Most nurses scored the highest value of 5 on the Likert scale questions evaluating the three different dimensions subscales. Of the Satisfaction with Simulation Experience Scale. 88.27% on the Debriefing and Reflections subscale, 73.89% on the Clinical Reasoning subscale and 82.29% on the Clinical Learning subscale.

From our cross-sectional study, therefore, emerges that learners reported a high level of satisfaction for the simulations and for the Clinical Learning, Clinical Reasoning and Debriefing and Reflection subscales; these results were independent from degree, workplace and sex.

Therefore, we can state that Advanced Cardiovascular Life Support is suitable even for health professionals that don't work in a Critical Care ward;

**Table 4:** percentage of scores on the Likert scale regarding the three different dimensions of the SSE Scale: D represents the Debriefing and Reflection subscale, C is Clinical Rationale subscale score and L stands for the Clinical Learning one.

	1	2	3	4	5
D	0.00%	0.00%	0.46%	11.27%	88.27%
R	0.00%	0.00%	2.50%	23.61%	73.89%
L	0.00%	0.00%	0.69%	17.01%	82.29%

furthermore, we can state that, even more skilled and experienced nurses appreciate, and probably benefit, from the simulations performed during the course. Considering that satisfaction in simulations relates with learning (2) and that resuscitation skills and performance decay as time goes by (24,25), we can say that ACLS course is an ideal method to provide to health professionals, and maintain, skills in resuscitation, independently from age, previous experiences and degree.

Our study is restricted to nurses, but other reports exist that confirm the improvement in patient's outcome after providing the Advanced Cardiovascular Life Support course to various types of health professionals (17,25,26).

In conclusion, considering that Advanced Cardiovascular Life Support course statistically improves patient's outcome (1,17,23,28,29) and is equally suitable and effective for health professionals (or, at least, nurses) at all levels of experience and education, it could be reasonable to fully integrate it into the mandatory health training.

The findings of this study have to be seen in light of some limitations. First, our sample consists of nurses and no other health professionals-, so our results must be limited to nurses' population. Second, in our study we did not relate satisfaction levels with test outcome, so in future might be interesting to assess if satisfaction relate with learning, as postulated by Levett-Jones et al (8). Last, even if the questionnaires were anonymous, learners might fear that Satisfaction with Simulation Experiences score could affects their test outcome, so they could have given higher point to every item.

**Conflict of Interest:** Each author declares that he or she has no commercial associations (e.g., consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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