

ORIGINAL RESEARCH RELATED TO CME

# A prospective study of students' and instructors' opinions on Advanced Cardiac Life Support course teaching methods

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## ABSTRACT

**Introduction:** The American Heart Association (AHA) revises the Advanced Cardiac Life Support (ACLS) course approximately every 5 years, citing the scientific literature for any changes to content and management recommendations. With ACLS 2005, the AHA also revised the methods used to teach course content. The AHA cited no evidence in making these changes. The ACLS 2005 course, distributed in early 2007, makes greater use of videos to teach students. This prospective study surveyed opinions of both students and instructors in an effort to determine the level of satisfaction with this method of teaching.

**Methods:** During 16 consecutive ACLS courses, all students and instructors were asked to complete a questionnaire. The students provided demographic information, but completed the survey anonymously. Four questions probed the participants' opinions about the effectiveness of videos in learning ACLS skills. Experienced participants were asked to compare the new teaching methods with previous courses. Opinions were compared among several subgroups based on sex, occupation and previous experience.

**Results:** Of the 180 students who participated, 71% felt the videos were unequivocally useful for teaching ACLS skills. Fewer first-time students were unequivocally positive (59%) compared with those who had taken 2 or more previous courses (84%). A small proportion of students (13%) desired more hands-on practice time. Of the 16 instructors who participated, 31% felt that the videos were useful for teaching ACLS skills. No differences were found between doctors and nurses, or between men and women.

**Conclusion:** The use of standardized videos in ACLS courses was felt by the majority of students and a minority of instructors to be unequivocally useful. First-time students had more doubts about the effectiveness of videos.

**Keywords:** Advanced Cardiac Life Support course, course assessment, teaching

## RÉSUMÉ

**Introduction :** L'American Heart Association (AHA) révisé le cours sur les soins avancés en réanimation cardiovasculaire (SARC) environ tous les 5 ans, s'appuyant sur la littérature scientifique pour

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toute modification au contenu et recommandation quant à la prise en charge. Avec la sortie de la version 2005 du cours de SARC, l'AHA a également révisé les méthodes utilisées pour donner le cours. Elle n'a cité aucune source pour appuyer ces changements. Le cours de SARC 2005, distribué au début de 2007, a davantage recours aux bandes vidéo comme méthode d'enseignement. Cette étude prospective visait à mesurer le degré de satisfaction des étudiants et des instructeurs à l'égard de cette méthode d'enseignement.

**Méthodes :** Nous avons demandé à tous les étudiants et à tous les instructeurs de 16 cours de SARC consécutifs de remplir un questionnaire. Les étudiants ont fourni des données démographiques, mais ont répondu au questionnaire sous le couvert de l'anonymat. Quatre questions portaient sur l'efficacité des vidéos pour l'apprentissage des techniques en SARC. Nous avons demandé aux sujets qui avaient déjà suivi ce cours de comparer les nouvelles méthodes d'enseignement à celles employées précédemment. Nous avons comparé les opinions entre plusieurs sous-groupes fondés sur le sexe, la profession et l'expérience antérieure.

**Résultats :** Parmi les 180 étudiants qui ont participé, 71 % étaient d'avis que les bandes vidéo étaient indéniablement utiles pour enseigner les techniques de SARC. Moins d'étudiants qui suivaient ce cours pour la première fois étaient convaincus de l'utilité des vidéos (59 %) par rapport à ceux qui avaient suivi ces cours 2 fois ou plus auparavant (84 %). Une faible proportion d'étudiants (13 %) aurait souhaité plus d'exercices pratiques. Parmi les 16 instructeurs qui ont participé à l'enquête, 31 % étaient d'avis que les bandes vidéo étaient utiles pour enseigner les techniques de SARC. Aucune différence n'a été constatée entre les médecins et les infirmières, ou entre les hommes et les femmes.

**Conclusion :** La majorité des étudiants et une minorité d'instructeurs ont jugé que les bandes vidéo normalisées étaient un outil utile pour les cours de SARC. Les étudiants qui suivaient ce cours pour la première fois ont exprimé plus de doute quant à l'efficacité de cet outil pédagogique.

## Introduction

Each revision of the Advanced Cardiac Life Support (ACLS) course incorporates changes to the content, based on varying levels of evidence.<sup>1</sup> In addition to providing scientifically derived content on direct approaches to patient resuscitation, the course also advises on methods for teaching students. In the most recent version of the course (ACLS 2005), the American Heart Association (AHA) directed that teaching be done in a significantly different style.

Changes to the ACLS content are well described and discussed in the emergency and cardiology literature. Students in ACLS courses are expected to learn most of this content from the provided text and CDs. Certain skills in the care of critically ill patients are taught to students using simulated clinical scenarios. Instructors lead small groups in active, hands-on learning stations where students practise essential skills individually, as part of a team and as a team leader.<sup>2</sup> The evidence clearly supports the use of realistic simulations to reinforce learning.<sup>3-5</sup> In ACLS 2005, this method was modified with the greater use of videos to replace some of the "live" instruction.

ACLS was designed for a range of health care professionals who may respond to cardiovascular emergencies,<sup>6</sup> and is typically taught by health care providers with an

interest in the subject and in teaching rather than by full-time, professional educators. The 2005 edition of ACLS uses more videos, not just as a replacement for traditional classroom lectures, but also to demonstrate team dynamics for the management of patient resuscitations and for teaching certain skills. For the first time, ACLS recommended the use of videos within small group sessions, or learning stations, where skills such as airway management in the unconscious patient are taught.

Although we found little published information on the reasons for this change, AHA's 2006 ACLS instruction manual states that part of the reason for this greater use of AHA-supplied videos was a perceived lack of consistency in what was taught among, and even within, courses.<sup>2</sup> We were unable to determine whether the ACLS course designers felt that an increased use of videos would be otherwise more effective than traditional methods of teaching.

From our experience as ACLS instructors, we anticipated that an increased reliance on videos would change the instructor–student dynamics of ACLS courses. Although the course videos are of high production quality, we doubted whether most participants would find them a desirable way to learn skills or team dynamics. Specifically, we hypothesized that older students and those with previous ACLS experience would find the videos less useful in learning new skills and ineffective as a model for

simulated resuscitations. We also felt that there would be less time for students requiring more assistance to master key concepts and skills. As all students would tend to receive the same instruction, i.e., that provided by the videos, this could result in less time for individual instruction.

The purpose of our study was to assess the impact of the new method of teaching by surveying the opinions of students and teachers taking an ACLS course.

## Methods

There were 2 parts to the study: the survey of the students and the survey of the teachers (Appendix 1, Appendix 2). Eligible participants for the first part included all students enrolled in consecutive ACLS 2005 courses. Students met the AHA's stated requirements for ACLS course participation.<sup>2</sup> All courses were taught by instructors certified by the AHA through the Canadian Heart and Stroke Foundation (CHSF) and organized by educational staff at the Life Support Center on the campus of Sheikh Khalifa Medical City (SKMC) in Abu Dhabi, United Arab Emirates. This centre is responsible for training participants from both SKMC and some 23 other community hospitals within the emirate of Abu Dhabi.

Both surveys consisted of a written questionnaire comprised of the following: 4 questions on the value of videos in the ACLS course; 3 questions on the student's previous ACLS experience and a comparison (when appropriate) of the current version with previous version(s); 1 question on whether there was enough time in the course to learn the required skills; and 5 demographic questions on age, sex, education, year of graduation and occupation.

Students completed the survey just before taking the written exam for the course. For responses to most questions, we elected to provide tick-box answers, which were categorized as definitely positive, definitely negative or neutral. We felt this approach would make it as simple as possible for participants to complete the survey while taking the course. Space was provided for written comments throughout the survey. Participants were not asked to provide their names or any other personal identifiers.

Participants were eligible for the teachers' survey if they were instructors for any of the ACLS courses in which surveyed participants had been enrolled. This survey was based on the student questionnaire, with minor changes to reflect a teacher's perspective.

The responses on the completed questionnaires were recorded in a Microsoft Excel (Microsoft, Corp.) spreadsheet and the prospectively collected data was analyzed using Excel statistical functions. Confidence intervals (CIs)

were calculated using Simple Interactive Statistical Analysis (SISA), an online statistical analysis software tool.

This study was approved by the SKMC Research Committee subsequent to collecting the data. While planning and initiating this study, the authors did not have the benefit of advice from the Investigation Review Board at SKMC. We endeavoured to protect the privacy of participants by having them provide all information anonymously. The participants were advised that they could refuse participation in the survey without consequence, but were not asked to sign a consent form. Although the authors had access to a list of all participants, they had no way to link a particular questionnaire with a specific individual.

## Results

ACLS 2005 was first taught at our institution in February 2007. Between February and September 2007, 185 health care professionals attended 16 consecutive ACLS courses. All agreed to participate in our study. Questionnaires were received from all participants; however, 5 were missing important demographic information, leaving 180 (97.3%) questionnaires appropriate for analysis. Of the 18 instructors who were eligible to be enrolled in the survey, 16 completed the questionnaires. Selected demographic characteristics of students are shown in Table 1.

In the student group, the mean age of women was 39 years; for men it was 42 years. About half the students (53 of 105 women and 34 of 75 men) had never taken an ACLS course before. Thirty-eight students had completed a course more than once before.

**Table 1. Characteristics of students in ACLS 2005 courses**

Characteristic	No. (%) of participants, <i>n</i> = 180
Sex	
Male	75 (42)
Female	105 (58)
Time since graduation, yr	
< 10	42 (23)
10–20	77 (43)
> 20	51 (28)
Not given	10 (6)
Occupation	
RN*	95 (53)
MD†	73 (40)
Other‡	12 (7)

ACLS = Advanced Cardiac Life Support; MD = medical doctor; RN = registered nurse.

\*72 of 95 were female.

†26 of 73 were female.

‡Includes respiratory technicians and emergency medical services personnel.

Students were generally positive in their opinions on the effectiveness of the videos for teaching ACLS. Of the 180 students, 128 (71.1%, 95% CI 0.64–0.78) students agreed unequivocally that videos were useful for teaching ACLS. Fifty participants rated the videos either positive or neutral in each of the 4 surveyed aspects of video use. Only 2 students indicated they felt videos failed in any aspect of being a useful teaching technique, both rating videos as “not useful” in the workshop setting of airway management. No subgroup of students significantly differed from the whole group in their opinion on the usefulness of videos, as shown in Table 2. The instructors’ responses are presented for comparison in the same table.

Instructors’ opinions on video use in teaching ACLS skills were less positive than the students’ opinions. Only 5 of the 16 instructors expressed a positive opinion of the videos. The small sample size of instructors resulted in a wide CI (31%, 95% CI 0.11–0.59). Despite this, the difference between instructors and students was striking.

Of the 16 instructors, 13 had taught previous versions of ACLS. When asked to compare ACLS 2005 with prior

versions of ACLS, students and instructors were divergent in their opinions, as shown in Table 3, although none felt the new format was worse than prior versions of ACLS.

Although a significantly larger proportion of students than teachers indicated that they believed the new video-based format was definitely superior to previous methods of teaching ACLS, both groups generally agreed that the consistency of teaching was improved in the 2005 version of ACLS.

Students’ written comments confirmed their tick-box answers in most cases, although it was noteworthy that 24 of 180 (13%) wrote that there should be more time to practise the simulated patient scenarios. Two instructors wrote they found the new format tedious and would reduce the number of courses they taught in future.

### Discussion

Our results show there were few differences in opinion among ACLS students based on sex, occupation or work experience. Physicians tended to be less positive than nurses in their assessment of video use in teaching, closely reflecting the opinion of all the men who participated. CIs, however, overlapped considerably. The differences in opinions on videos became more apparent between the naive participants and those who had taken ACLS in the past. Contrary to our expectations, the more often participants had previously taken ACLS, the more enthusiastic was their belief that videos were unequivocally useful for teaching ACLS skills, although the CIs of students with the most previous ACLS experience and naive students overlapped slightly. Inexperienced students may have had more difficulty with the video-based teaching methods because of reduced individual instruction. Alternatively, the results may be reflective of enrolment bias: those who have difficulty on their first exposure to ACLS may avoid subsequent courses.

Although the instructors comprised a much smaller sample, they remain an important group to assess the changes

**Table 2. Proportion of students and teachers with unequivocally positive opinion regarding video use in ACLS 2005**

Students and teachers	No. (%) with positive opinion	95% CI
Subgroups of students		
MDs	48 (67)	0.55–0.77
RNs	70 (75)	0.65–0.83
Naïve	57 (66)	0.55–0.75
Second time	40 (75)	0.62–0.86
Veteran	31 (84)	0.67–0.93
Male	49 (65)	0.53–0.76
Female	79 (75)	0.66–0.83
All students	128 (71)	0.64–0.78
Teachers		
All teachers	5 (31)	0.11–0.59

ACLS = Advanced Cardiac Life Support; CI = confidence interval; MD = medical doctor; RN = registered nurse.

**Table 3. Comparison of ACLS 2005 video-based teaching with previous versions of ACLS**

Selected aspects of comparison	No. (%) [95% CI]			
	Second-time and veteran students, n = 93		Instructors, n = 13	
Opinion				
Much better	60 (65)	[0.54–0.74]	3 (23)	[0.05–0.54]
Somewhat better/same	27 (29)	[0.20–0.39]	9 (69)	[0.39–0.91]
More consistency	84 (90)	[0.82–0.95]	11 (85)	[0.55–0.98]

ACLS = Advanced Cardiac Life Support; CI = confidence interval.

made in the latest version of ACLS. The instructors who we studied had more experience with previous versions of ACLS. Their opinions on the use of videos were significantly less positive than those of students who had previously taken ACLS courses. The difference between the number of instructors and students who felt that the new method of teaching was "much better" even reached statistical significance despite the small number of instructors available to survey. Although instructors had doubts about the value of video-based teaching and felt much less positive when directly comparing it with previous experiences, none felt that video-based teaching was worse than the more traditional teaching styles of the previous ACLS courses.

Our original doubts about how useful instructors would find the videos for teaching ACLS skills were dispelled. They largely felt the use of videos to be at least as useful as previous methods, although some expressed a lack of enthusiasm for the actual process of teaching using videos.

Education professionals generally believe that the ideal teaching situation is the one-to-one tutorial.<sup>7</sup> This concept probably underlies our initial hypothesis. However, this method of teaching is not feasible for ACLS courses. Lectures to groups of ACLS students are an efficient use of an instructor's time, but are now known to be poor learning situations. Technology has been increasingly used in an effort to improve the simple transmission of information to students and engage them in an active process of learning. Various authors have postulated how the proper use of embedded video (multimedia) could be effective. Students may simply be better motivated to pay more attention to video presentations than to someone speaking to them.<sup>8</sup> Others have suggested that the use of multimedia allows better retention of information, essentially because students process information independently through 2 cognitive channels, to be retained in 2 separate memories: verbal and visual.<sup>9,10</sup> In our search of the education literature, we found no published studies of teaching with embedded multimedia reporting negative effects on student learning. We are unaware of any similar studies in the medical literature, and identified none with which we could compare our findings.

### Limitations

There are several limitations to our study. Most importantly, we did not look at outcomes. Learning and retention of skills by students were not assessed, either by testing, or in real-world outcomes of patient care by students. Evaluating ACLS teaching has always been difficult.<sup>11</sup> Incremental improvements in outcomes have been linked to specific actions (such as early defibrillation and effective

uninterrupted cardiopulmonary resuscitation) rather than improvements in teaching methods.<sup>1,12</sup>

Our study looked prospectively at participants' opinions on this latest version of the ACLS course. Part of the survey asked students and instructors to compare the current version with recalled impressions of previous versions, raising the well-known possibility of recall bias. The ideal way to have avoided this problem would have been to administer a similar survey instrument during previous ACLS courses, but we were unaware that changes to the method of teaching ACLS would be so significant until we received the AHA package from the CHSF. Our centre also received a directive from the CHSF stipulating that ACLS 2005 must only be taught incorporating the videos provided, precluding our use of a before-after methodology of this nature.

Although our study attempted to look at the teaching methods used, the content of the course could not be controlled. Our impression was that students are happy with the recent changes in content (with its somewhat simpler approach to most problems) and this may have positively influenced opinions about the effectiveness of the teaching.

Finally, the questionnaire we employed has not been validated elsewhere. It was derived on short notice to provide limited ordinal responses to a relatively small number of questions. We believe any limitations of this approach were outweighed by the advantage of early initiation of the study and a high response rate.

### Conclusion

The use of standardized videos in ACLS courses was felt by the majority of students and a minority of instructors to be unequivocally useful. The new course version was rated "much better" by 65% of students, but only 23% of instructors; no student or instructor rated it as "worse." All respondents felt that the use of videos produced more consistent teaching. Although the new ACLS approach appears to be successful in making the course more appealing to students, any impact of this on the effectiveness of the education remains undetermined.

**Competing interests:** None declared.

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**Appendix 1. ACLS 2005 course — survey of students**

With this version of ACLS (2005), the American Heart Association has made some changes in the way the course is taught. Having just completed this most recent ACLS course, please complete the following survey. It should take only a few minutes.

1. How many times have you taken an ACLS course in the past?  
Never  Once  More than once
  2. Do you think the videos were a good way to learn ACLS skills?  
Very helpful  Somewhat helpful  Not helpful   
Comment: \_\_\_\_\_
  3. Did the video presentations used in teaching various aspects of ACLS hold your interest?  
Very well  Somewhat  Not very well   
Comment: \_\_\_\_\_
  4. Airway management procedures were taught while watching the "practice-while-watching" video. How did you find this method of teaching?  
Useful  Had some trouble with it  Not useful for me   
Comment: \_\_\_\_\_
  5. Were you able to ask the instructors all the questions that you wanted to, in the time given?  
Yes, there was enough time  No, there wasn't enough time   
Comment: \_\_\_\_\_
  6. Do you think watching the ACLS *megacode* video helped you in actually running your own *megacode*?  
Yes, it helped  Not sure  No, it did not help   
Comment: \_\_\_\_\_
- If this was your first ACLS course, go to question 9 in the survey.
7. Compared to previous ACLS courses, do you think watching the videos was a better way to learn the required skills?  
Much better  Somewhat better  About the same   
Somewhat worse  Definitely worse   
Comment: \_\_\_\_\_
  8. Compared to previous ACLS courses, do you think the use of videos in this course produced more consistency in what was being taught?  
Yes, more consistency  No difference  No, less consistency
  9. Please suggest what you think would make this course better: \_\_\_\_\_  
\_\_\_\_\_

Please answer these questions so we know a little bit about you.

10. Your age \_\_\_\_\_
11. Male  Female
12. Occupation: RN I  RN II  RT   
Physician  Consultant Physician   
Other (please state) \_\_\_\_\_
13. Year of graduation from health care training: \_\_\_\_\_
14. Time working at present location: \_\_\_\_\_ years.

Thank you making the effort to answer these questions. We hope this survey will be useful in improving the quality of teaching of ACLS.

If you have any questions regarding this survey, please contact either Dr. James Stempien or Dr. Martin Betz through SKMC.

ACLS = Advanced Cardiac Life Support; RN = registered nurse; RT = respiratory technician; SKMC = Sheikh Khalifa Medical City.

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**Appendix 2. ACLS 2005 course — survey of teachers**

With this version of ACLS (2005), the American Heart Association has made some changes in the way the course is taught. As a teacher of this version of ACLS we would appreciate it if you would take a few minutes to complete this survey.

1. How many versions of the ACLS course have you taught in the past?  
 2005 only  2000  2000 and before

2. Do you think the videos were a good way to teach ACLS skills?  
 Very helpful  Somewhat helpful  Not helpful   
 Comment: \_\_\_\_\_

3. Did the video presentations used in teaching various aspects of ACLS hold your students' interest?  
 Very well  Somewhat  Not very well   
 Comment: \_\_\_\_\_

4. Airway management procedures were taught while watching the "practise-while-watching" video. How did you find this method of teaching?  
 Good  Students had trouble with it  Not very good   
 Comment: \_\_\_\_\_

5. Were students able to ask you all the questions they wanted to, in the time given?  
 Yes, there was enough time  No, there wasn't enough time   
 Comment: \_\_\_\_\_

6. Do you think watching the ACLS *megacode* video helped students in actually running their own *megacodes*?  
 Yes, it helped  Not sure  No, it did not help   
 Comment: \_\_\_\_\_

If this was your first ACLS course, go to question 9 in the survey.

7. Compared to previous ACLS courses, do you think watching the videos was a better way for students to learn the required skills?  
 Much better  Somewhat better  About the same   
 Somewhat worse  Definitely worse   
 Comment: \_\_\_\_\_

8. Compared to previous ACLS courses, do you think the use of videos in this course produced more consistency in what was being taught?  
 Yes, more consistency  No difference  No, less consistency

9. Please suggest what you think would make this course better: \_\_\_\_\_  
 \_\_\_\_\_

Please answer these questions so we know a little bit about you.

10. Your age \_\_\_\_\_  
 11. Male  Female   
 12. Occupation: RN I  RN II  RT   
 Physician  Consultant Physician   
 Other (please state) \_\_\_\_\_

13. Year of graduation from health care training: \_\_\_\_\_

14. Time working at present location: \_\_\_\_\_ years.

Thank you making the effort to answer these questions. We hope this survey will be useful in improving the quality of teaching of ACLS.

If you have any questions regarding this survey, please contact either Dr. James Stempien or Dr. Martin Betz through SKMC.

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