Original Article

Effectiveness and perception of demonstration-observation-assistance-performance (DOAP) versus video-assisted learning (VAL) in training advanced cardiac life support (ACLS) among medical interns – A comparative study

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Abstract:

BACKGROUND: Demonstration-Observation-Assistance-Performance (DOAP) and Video-Assisted Learning (VAL) are small-group teaching/learning methods (TLM) in medical education. Comparison studies between the two are scanty. There is a gap in knowledge, skills, and attitude among medical interns toward Advanced Cardiac Life Support (ACLS). The author studied the effectiveness of DOAP and VAL in training ACLS using mannequins and automated external defibrillator (AED)-simulators among interns in 2021.

MATERIALS AND METHODS: This descriptive study was done in the Emergency Department of a tertiary teaching hospital in South India. Out of 80 medical interns, 39 and 41 were allocated to ACLS training by DOAP (Group 1) and VAL (Group 2), respectively, by convenient sampling with random allocation, with the use of mannequins and AED-Simulators (10 interventions in each small group; three-five participants in each session). Pre-validated pre-test and posttest multiple-choice questionnaires (MCQs) and attitude questionnaires, OSCE by two blinded assessors, and perception by Likert-based questionnaire were analyzed with appropriate statistical analysis.

RESULTS: The mean pretest and posttest MCQs and Attitude and OSCE scores of DOAP and VAL showed no statistically significant difference between them (MCQ pre-test 44.51 (11.43); 42.54 (6.56); $p = 0.350$ and MCQ posttest, 78.97 (8.59); 77.22 (11.29); $p = 0.438$; OSCE 40.51 (2.43) and 40.63 (1.92); $p = 0.804$; Attitude: 11 (3), 11 (2); $p = 0.567$; 14 (2), 14 (3); $p = 0.095$). MCQ post-tests showed improved scores ($p < 0.001$) in both the methods and the standardized mean difference based on the MCQ scores for the DOAP group was 3.02, and for the VAL group 3, showed the effectiveness of both methods. Perception scores showed learners' interest and positive feedback to both methods and ACLS.

CONCLUSION: Both DOAP and VAL were equally effective TLMs in imparting knowledge, skills, and attitude to medical interns with positive feedback. In DOAP, the learner performs under supervision and clarifies doubts. As repeatable and cost-effective, VAL is useful in resource-limited settings. Both can be used as complementary methods in training ACLS. The attitude of learners towards ACLS improved with training.

Keywords:

Advanced cardiac life support, medical education, small group teaching/learning methods, video-based learning

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Introduction

The National Medical Commission (NMC) has implemented Competency-Based Medical Education (CBME) in India in unison with many other countries.[1] The Indian Medical Graduate (IMG) is expected to have core competencies to enable him/her in different roles of a first-line contact physician in the community. The skills of knows, knows-how, shows, shows-how and does are learned in various phases, and does/performs levels of some competencies are attained in the internship phase. The emphasis on change in teaching-learning methods (TLM) is a novelty in CBME in which student-centered TLM is given importance. Use of skill labs, simulation and guided environment, implementation of small group teaching/learning (SGT/L), and student-directed learning (SDL) is also recommended. The formative and summative assessments with Objective Structured Clinical Examinations (OSCE), Mini-Clinical Examinations (Mini-CEX), Objective Structured Practical Examination (OSPE), Direct Observation of Procedural Skills (DOPS), etc., are focused compared to the traditional methods.[1,2] SGT/L mainly includes Demonstration-Observation-Assistance-Performance (DOAP), Video-Assisted Learning (VAL)/Video-Based Learning (VBL), Problem Based Learning (PBL), group discussions, and Case-Based Learning (CBL). The advantages of small group methods are that students can get more personal attention and more student involvement. The small group teaching can be improvised with the use of computer-based audiovisuals, simulations, mannequins, standardized patients, real patients, and training for the teachers or facilitators. Though demonstrations were part of the traditional teaching methods, in DOAP, the student observes the demonstration by the teacher, and gets the opportunity to assist and perform in the simulated environment, on standardized patients, and in real patients under supervision and independently.[3] The advantages of DOAP are that there is individual attention to the students, students can clear their doubts, the classes can be modified as per the student interaction and needs, and students can be assessed (formative assessment) simultaneously during assistance and performance phases, access to student feedback and learning. VAL has the advantage that it is a student-directed learning method. Once properly planned and designed, VAL can be implemented with less teacher involvement reducing the workload of the faculty, who can utilize their time for other useful works in resource-limited institutions.[4-6] The comparison studies between the traditional demonstration and VAL/VBL showed conflicting outcomes, while the comparison studies of DOAP with VAL are scanty.[3,7-9] The knowledge, skills, and attitude of medical interns toward Cardiopulmonary Resuscitation (CPR) are found to be poor.[10] American Heart Association (AHA) provides and updates guidelines on Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS).[11,12] The NMC insists BLS is an essential competency to be taught in the foundation course in the MBBS curriculum. ACLS is the core competency to be attained by a medical graduate before leaving the institution.[1] While laypersons are eligible for AHA certified BLS course only, Health Care Workers (HCW) including physicians are eligible for the ACLS course also, which consists of BLS and ACLS modules and video-based training with mannequins and Automated External Defibrillator (AED)-Simulators in small groups by qualified instructors with formative assessment, remediation followed by certification for a fee. In both courses, the emphasis on high-quality CPR skills for a positive outcome is validated.[11] As the exposure to resuscitations is less in many hospitals, the physicians and health care workers tend to lose their knowledge, skills, and attitude towards ACLS.[13] ACLS training classes emphasize simulation-based training modality as this appeared to be superior to traditional clinical medical education.[14] Periodic repetition of resuscitation courses is recommended to improve knowledge, skills, and attitude.[15,16] Though both DOAP and VAL can be implemented with the use of mannequins, AED-Simulators, and airway adjuncts in teaching BLS-ACLS, there is no evidence based on which method is better for the learners. In this circumstance, this study was aimed at the effectiveness and perception of DOAP and VAL in imparting the knowledge, skills, and attitude toward ACLS among medical interns in the Emergency Medicine Department. The knowledge was assessed by multiple-choice questions (MCQs), the skills by OSCE on mannequins in a simulated environment, and attitude by questionnaire. The interns' perception of DOAP and VAL was assessed by a feedback questionnaire.

Objectives

1) To determine the effectiveness of DOAP and VAL with Mannequins and AED-Simulators in imparting the knowledge, skills, and attitude among medical Interns in the Emergency Medicine Department toward Advanced Cardiac Life Support.
2) To assess the perception of medical interns toward the use of DOAP and VAL as a teaching-learning method

Materials and Methods

Study design and setting

The study was conducted in the Emergency Medicine Department (EMD) of a *tertiary hospital*, in India, for the period of 9 months from January to September 2021.

Study Design: Descriptive study, Study Subjects: The Medical interns posted in the EMD during the study period. Inclusion Criteria: Medical Interns posted in EMD during the study period who were willing to participate with informed consent. Exclusion Criteria:
1. Those not willing to participate.
2. Those underwent a Structured Course in BLS/ACLS within less than 2 years.

Study participants and sampling

Based on the previous studies, the minimum sample size comes to 25–40 in each group, fixing the level of significance at 5% and power at 80%, with the mean and (SD) in the first group as 16.85 (1.5) and the second group 15.94 (1.4), respectively, the minimum size comes to 40 in each group, i.e., a total of 80 subjects and using the values of mean and (SD) in the first group as 16.78 (1.1) and second group 15.86 (0.91), with the level of significance fixed at 5% and power at 90%, the minimum size comes to 25 in each group, i.e., a total of 50 subjects as per the formula[7]:

Formula

$\eta = 2 \, S_p^2 \, [Z_{1-\alpha/2} + Z_{1-\beta}]/\mu_d^2$ Where $S_p^2 = (S_1^2 + S_2^2)/2$

S_1^2: Standard deviation in the first group

S_2^2: Standard deviation in the second group

μ_d^2: Mean difference between the samples

α: Significance level

$1-\beta$: Power

The present study included 80 participants with random allocation into two groups of 39 and 41. All interns posted during the study period willing to participate (80 numbers) were included. The interns were posted for 15 days in EMD. Convenience sampling with random allocation to two groups was done by random numbers. Study Interns were randomly allocated into two groups by simple randomization, resulting in 39 and 41 subjects respectively in the first and second groups. The first group was provided DOAP and the second group with VAL. Thus, a total of 10 interventions in each group were done during the study period with each session consisting of three-five participants. After obtaining the Institutional Research and Ethics committee's approval and obtaining informed consent, the interns (who were exposed to the traditional system of medical education) posted in the Emergency Medicine Department during the study period of 9 months were randomly allocated to two groups by random number method. All participants were required to answer a validated pretest to assess their basic knowledge level by MCQs and a questionnaire

to assess their attitude toward ACLS. Each team of Interns was allocated into 2 groups. Group 1 (39 Subjects) was trained by DOAP and group 2 (41 subjects), by VAL for 2 hours. In DOAP, the investigator demonstrated the ACLS steps with the audiovisual aids on mannequins using airway adjuncts and AED-Simulator, cleared doubts, and the students assisted and performed under supervision and independently on the mannequins. In VAL, a video on the ACLS scenario with detailed steps was shown and students were directed to pause, perform, and practice on the mannequins using airway adjuncts and an AED-Simulator with peer review and correction with pause and replay of the video. After the session, the posttest MCQ was given. An OSCE was conducted by two experienced emergency physicians blinded to the intervention groups with the help of a checklist as per the guidelines of AHA 2020 and an average score was taken. A post-intervention attitude questionnaire was collected. Perceptions of interns were collected by a validated 5 points Likert scale-based feedback questionnaire. The pretest/posttest MCQ consisted of 25 MCQs carrying a score of 1 point for each correct answer with a minimum score of 0 and a maximum score of 25 marks. The pretest/ posttest questionnaires, the attitude questionnaire, the OSCE test score sheet, and the 5 points Likert scale-based feedback questionnaire were pre-validated by two EM consultants from another institute. After the data was collected, remediation was done and a cross-over was provided for ethical reasons.

Data collection tool and technique

Tools: The tools used were an LCD Projector with teaching materials, Videos, Mannequins, pocket masks, Ambulatory Manual Breathing Unit (AMBU) with masks, AED-Simulators, Oropharyngeal Airways, Nasopharyngeal Airways, and pre-validated Multiple-choice questionnaire, Checklists based on guidelines of American Heart Association for OSCE, Attitude questionnaire, and Likert scale-based feedback questionnaire. The pre-validated pretest attitude, pretest MCQ questionnaires, posttest MCQ, OSCE, attitude questionnaires, and feedback questionnaires based on the Likert scale were collected [Figure 1].

Statistical analysis

Data was entered in the Excel sheet and analyzed using SPSS Statistics for Windows, version 24 software with descriptive statistics like frequency, percentages, mean, standard deviation, median and interquartile range. Inferential statistics like paired and unpaired t-tests and Mann-Whitney U tests were used to test for any significant difference in attitude and perception between the groups. Wilcoxon signed-rank test was used for intragroup comparison of attitude. A p value less than or equal to 0.05 was considered significant. The effectiveness of the intervention (MCQ scores)

was assessed by the standardized mean difference. The standardized mean difference is the difference between the mean scores of the two groups divided by their common standard deviation. The method with a Standardized mean difference of at least 3 is effective.

Ethical considerations

Institutional Ethics and Research Committees' approval was obtained before the study (No: 108/2019/IEC/GMCK Dated 30/12/2020). Informed consent was obtained from the participants.

Results

A total of 80 interns took part in the present study. Out of 80 participanats, 39 (48.8%) underwent DOAP (group1) while 41 (51.2%) underwent VAL (group2) [Table 1]. The mean age of the study participants was 24 years with a standard deviation of 0.5 years (78.8%). Females comprised 66.25% of the total, roughly double the number of males (33.75%) [Table 2]. Comparison of MCQ Scores: The mean pretest knowledge (by MCQ) scores of DOAP and VAL (Mean ± SD) were 44.51 ± 11.43 and 42.54 ± 6.56. There was no statistically significant difference in these scores. ($p = 0.350$). There was also no statistically significant difference in the posttest values between the two methods, 78.97 ± 8.59 and 77.22 ± 11.29 ($p = 0.438$) [Figure 2, Table 3]. As the variables were following normal distribution, both groups were comparable at baseline using Student's t-test for independent means indicating no significant difference in posttest scores (out of 100) between the two groups (using Student's t-test for independent means [unpaired]). The standardized mean difference based on the MCQ scores for the DOAP group was 3.02 and for the VAL group, 3. Comparison of OSCE scores:

There was no significant difference in OSCE scores between the two groups (using the student's t-test for independent means). OSCE scores of DOAP and VAL were 40.51 ± 2.43 and 40.63 ± 1.92 out of 50) and were statistically insignificant ($p = 0.804$) implying that the difference between the two methods was not significant statistically [Figure 2, Table 4]. Comparison of Combined MCQ and OSCE scores: There was no significant difference in the total scores of the two groups (using the student's t-test for independent means). The total score comparison also showed an insignificant difference between the two methods (80 ± 5.85 vs 80.15 ± 4.16; p value 0.898) [Figure 2, Table 5]. Comparison of Intragroup pretest and posttest scores in DOAP and VAL: Comparison between pretest and posttest scores with Student's paired t-test shows that both methods were effective with improved posttest scores (DOAP 44.51 ± 11.43 to 78.97 ± 6.56, $p < 0.001$; VAL 42.54 ± 6.54 to 77.22 ± 11.29, $p < 0.001$) indicating non-inferiority of VAL in comparison with DOAP [Figure 2, Table 6]. Comparison of Attitude and Perception Scores: Using Mann Whitney U test, there was no significant difference between the two groups regarding the scores (Median ± IQR) in the pretest attitude (11 ± 3, 11 ± 2; p 0.567), posttest attitude (14 ± 2, 14 ± 3; P 0.095) and perception (19 ± 5, 17 ± 5; p 0.084) [Figure 2, Table 7]. Comparison within the groups on Attitude scores: Using Wilcoxon signed-rank test, there was a significant difference in the attitude scores (Median ± IQR) in both groups (DOAP: 11 ± 3, 14 ± 2, $p < 0.001$). So, looking at the medians, it was evident that the attitude had significantly increased after the training in both groups. The feedback from the participants on the method of training allocated to them did not differ between the groups. The participants either agreed or strongly agreed on the different aspects of the parameters of the teaching-learning components as evidenced in their reflections showing a high level of satisfaction. In the
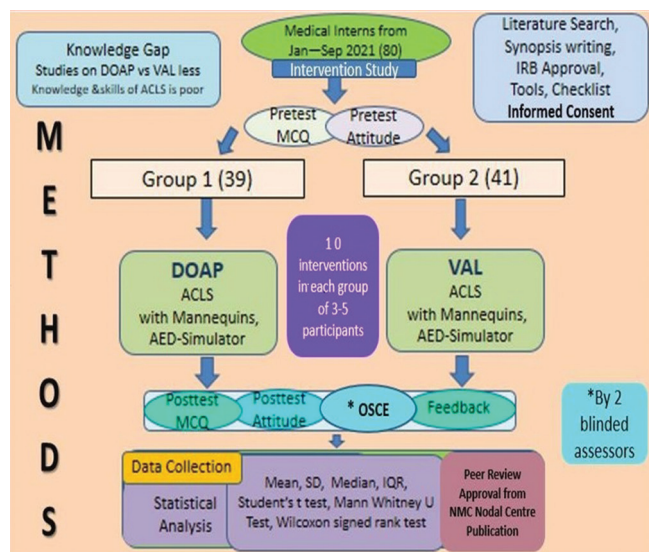

Figure 1: Materials and methods – algorithm

Table 1: Group distribution of Interns in DOAP* vs VAL† study

Group	Frequency	Percent
DOAP*	39	48.8
VAL†	41	51.2
Total	80	100.0

Footnote: *, DOAP – Demonstration- Observation- Assistance- Performance; †VAL – Video-assisted learning

Table 2: Age and gender distribution in the DOAP* vs VAL† study

Age (Yrs.)	Frequency	Percent	Gender	Frequency	Percent
23	11	13.8	Male	27	33.75
24	63	78.8	Female	53	66.25
25	6	7.5			
Total	80	100.0	Total	80	100.0

Footnote: *, DOAP – Demonstration- Observation- Assistance- Performance; †VAL – Video-assisted learning
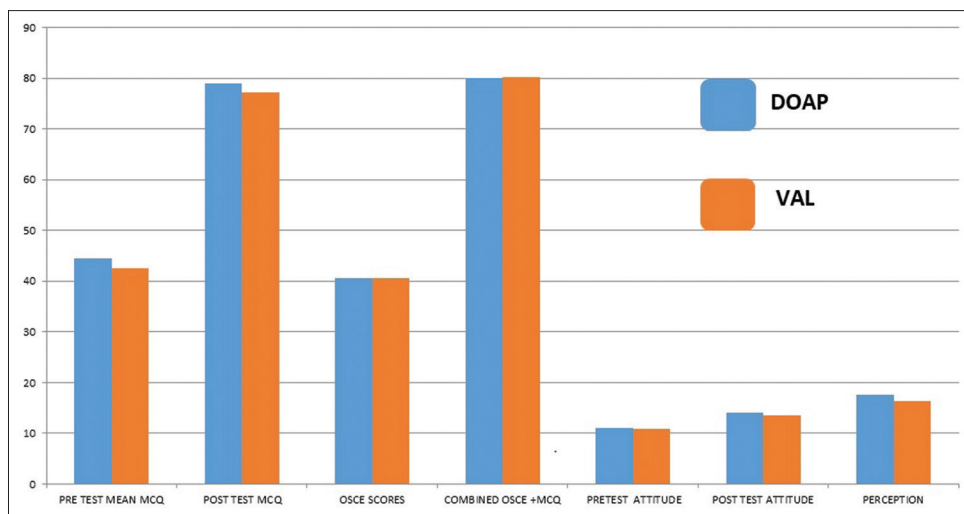
Figure 2: Comparison of scores in DOAP vs VAL in ACLS training

Table 3: Comparison of pretest and posttest MCQ* scores of DOAP† Vs VAL‡ study

Group	Pretest Mean	Std. Deviation	$p^§$	Posttest Mean	Std. Deviation	$p^§$	Standardized mean difference
DOAP†	44.51	11.43	0.350	78.97	8.59	0.438	3.02
VAL‡	42.54	6.56		77.22	11.29		3.0

Footnote: *, MCQ – Multiple choice questions; †DOAP – Demonstration- Observation- Assistance-Performance; ‡VAL – Video-assisted learning; §$P \leq 0.05$ is considered statistically significant

Table 4: OSCE* scores in DOAP† and VAL‡ groups

Group	Mean	Std. Deviation	p
DOAP	40.51	2.43	0.804
VAL	40.63	1.92	

Footnote: *, OSCE, objective structured clinical examination; †, DOAP, Demonstration- Observation- Assistance- Performance; ‡, VAL, Video-assisted learning

Table 5: Total score (MCQ+OSCE)* comparison between groups

Group	Mean	Std. Deviation	p
DOAP†	80.00	5.85	0.898
VAL‡	80.15	4.16	

Footnote: *, MCQ + OSCE, total score in multiple choice questionnaire and objective structured clinical examination; †, DOAP, Demonstration- Observation- Assistance- Performance; ‡, VAL, Video-assisted learning

Table 6: Comparison of pre-test and Post-test knowledge between DOAP* and VAL† groups

Group	Mean	Std. Deviation	Std. Error Mean
DOAP			
Pre-test MCQ‡ score in 100	44.51	11.43	<0.001
Posttest MCQ score in 100	78.97	8.59	
VAL			
Pre-test MCQ score in 100	42.54	6.56	<0.001
Posttest MCQ score in 100	77.22	11.29	

Footnote: *, DOAP – Demonstration- Observation- Assistance- Performance; †VAL – Video-assisted learning; ‡, MCQ, Multiple choice questionnaire

DOAP group, 87.2% strongly agreed that the student was given attention in the session while 82% strongly agreed that DOAP helped to boost performance and the method helped reproducibility. In the VAL group, 82.9% strongly agreed that understanding and following were better while 80% strongly agreed that the student was given attention in the session. The author and team found that the VAL was easy to produce and cost-effective as fewer teachers were needed for training. The team opined that DOAP and VAL could be used complementary to each other with initial DOAP and subsequent VAL for refresher learning courses. If VAL is designed properly and developed the cost-effectiveness was good compared to DOAP in which more resources and workforce were required.

Discussion

Most participants were females (66.25%) and of age 24 years (78.8%). The pretest and posttest by MCQs showed that the knowledge level had increased considerably in both groups. Both groups were found to impart knowledge effectively as evidenced by the standardized mean difference in both groups. Between the groups, there was no statistically significant difference in scores implying that there was no difference between the effectiveness of the two methods in imparting knowledge. OSCE scores of DOAP and VAL showed that both methods were equally effective in imparting skills of ACLS to medical interns. The difference in scores between the methods was statistically insignificant and may be due to chance. The combined MCQ and OSCE scores also did not show any difference between the two indicating that both methods were equally effective. No significant difference was observed between the

Table 7: Comparison of pretest and posttest attitude and perception between DOAP* and VAL† groups

Variable	Median	IQR‡	Median	IQR‡	p
Pre-test attitude	11	3	11	2	0.567§
Post-test attitude	14	2	14	3	0.095§
Perception	19	5	17	5	0.084§
p in Wilcoxon signed rank test in intragroup pretest vs posttest in DOAP					<0.001
p in Wilcoxon signed rank test in intragroup pretest vs posttest in VAL					<0.001

Footnote: *DOAP, Demonstration- Observation- Assistance- Performance; †VAL, Video-Assisted Learning, ‡, IQR, Interquartile range; §, p in Mann Whitney U test

two groups concerning attitude towards ACLS. In both groups, considerable improvement in attitude towards the practice of ACLS after the training was evident as per Wilcoxon signed-rank test ($p < 0.001$). So, looking at the medians, it was evident that the attitude had increased after the training in both groups and was statistically significant. The feedback from the participants on the method of training allocated to them did not differ between the groups. The participants either agreed or strongly agreed on the different aspects of the parameters of the teaching-learning components as evidenced in their reflections showing a high level of satisfaction. In the DOAP group, 87.2% strongly agreed that learners were given attention in the session while 82% strongly agreed that DOAP helped to boost performance and the method helped reproducibility. In the VAL group, 82.9% strongly agreed that understanding and following were better while 80% strongly agreed that learners were given attention in the session.

The success of medical education depends on innovation in TLM as per the change and needs of society and student perception. DOAP is a method in which the teacher teaches the subject to a small group with audiovisuals and simulators or mannequins or standardized patients in a simulated environment. The teacher demonstrates, students observe, assist the teacher and then perform under supervision and independently as per the phase of the course. The VAL is another small group TLM in which the teacher prepares an appropriate video on the subject and the students must learn by practicing on simulators or mannequins. VAL encourages students' inquisitiveness and learning ability through the interaction between peers and inculcates lifelong learning habits in the students. The comparison studies between the two are lacking, but the traditional demonstration is compared with VAL with variable results. A comparison study conducted by Sundeep S and Swapna K. Pillai showed a higher score in video-assisted teaching and they concluded that video-assisted teaching was equally effective as DOAP in teaching examination of deep tendon reflexes to medical students.[3] Ahmet et al.,[4] in a systematic review of 9 articles on video-based education with traditional teaching methods concluded that videos are effective tools for teaching surgical skills. Todd et al.,[5] in a comparison study of video-based CPR vs traditional instructor-based

demonstration, found that the VBL group had reduced response-to-compression-time while other parameters were comparable. Yaqinuddin A et al.,[6] discussed the various computer and mobile device-assisted e-learning and e-assessment in medical education compatible with the Covid-19 pandemic. Mouneghi HK et al.,[7] in a comparison study, showed that demonstration was more effective in practical learning skills in comparison with the video-based education method. The demonstration showed higher learning rates than VAL. Pilieci SN et al.,[9] in a comparison study found video education superior to traditional skill demonstration in teaching sterile surgical techniques to medical students. Students perceived that videos were convenient, accessible, efficient, and reviewable while skill demonstration provided knowledge retention, preparedness, and ease of completion. Chandrasekaran S et al.,[10] also found poor BLS knowledge in doctors and students. Olasveengen et al.,[11] discussed ACLS recommendations. Kundra and Vinayagam described guidelines and modifications in ACLS in Covid 19 pandemic.[12] Nambiar M et al.,[13] opined that inadequate knowledge of BLS/ACLS principles among HCWs especially physicians needed redressal sessions of training. McGaghie WC et al.,[14] found that simulation-based medical education with deliberate practice was better than traditional clinical education in imparting skills. High-fidelity simulators with feedback facilities could improve the learners' skills. As the skills and knowledge of BLS/ACLS fade, Anderson R et al.,[15] recommended a monthly refresh course on mannequins with real-time visual feedback to retain CPR skills. Abolfotouh MA et al.[16] concluded that repeated exposure to BLS-ACLS training programs could improve the attitudes of participants toward CPR performance and the use of AED. Training that could address the concerns of healthcare workers also could improve attitudes. The present study also found that the attitude towards ACLS improved with training. Devi B et al.,[17] in third-year students of Bachelor of Science in Nursing, found that demonstration scored much better than the video-assisted teaching program when the posttest skills were compared with the pretest in obstetric palpation (t = 36.40, $p = 0.001$ vs 18.35, $p < 0.001$) though both methods were effective in enhancing skill. Mayer RE et al.,[18] remarked that though video-based training seemed to be passive, it could stimulate inactive learners to engage, think and improve abilities leading to learning,

understanding, and retention. The affective domain of the learners is influenced by sound and music. Repeatability, feasibility, emotional content consistency of information, and flexibility were the advantages of the Videos. Roshini KN and Andrews MA found non-inferiority with the traditional demonstration in comparison to video in teaching mechanism of labor.[19] Grześkowiak M recommended a yearly refresher course for retaining resuscitative knowledge and skills.[20] McCoy CE et al.,[21] concluded that high-fidelity simulation training was superior in ensuring high-quality CPR with adequate chest compression depth and chest compression fraction (CCF) to low-fidelity CPR manikin training. Ramakrishnan R et al.,[22] showed that video recording of BLS practice could be used as a formative assessment tool. Chilkoti G et al.,[23] found that implementation of a hybrid-Problem-based learning format along with the lecture-based method provided high satisfaction among undergraduate medical students in BLS/ACLS teaching. In a comparison study between combined video display and live demonstration methods, Li Y et al.,[24] found that the latter was more suitable for medical staff in learning how to don and doff PPE. Alqahtani ND et al.,[25] opined that carefully designed and developed procedural video is equally as effective as a live demonstration and both methods should be considered to match the different learning preferences of students. The author's team also found that VAL was a suitable student-directed small group teaching-learning method in resource-limited scenarios and recommended that in developing countries as it was repeatable and required fewer teachers to conduct. In a comparison study of lecture demonstration vs video demonstration on knowledge acquisition on oral medication administration among student nurses, Sugathapala, RDUP, Chandrika, MGR found that both conventional demonstration methods and video-assisted teaching methods were equally effective.[26] This was in unison with the finding of the present study. A randomized comparison study of video demonstration versus hands-on training of medical students for vacuum delivery using Objective Structured Assessment of Technical Skills (OSATS) conducted by Hilal Z et al.,[27] found that structured hands-on training on a pelvic dummy was more effective than a teaching video. Arumugom A and Chandrasekaran V in a Randomized Comparison study between video demonstration and verbal instruction in Improving Rota haler technique in children with persistent asthma found that the number of children achieving good Rota haler technique was significantly more in the video demonstration group at immediate assessment (57.14% vs 14.28%, p value = 0.0461) and after one month following intervention (92.86% vs 35.71%, p value = 0.0044).[28] The novelty of the present study is that such studies are lacking from EDs in India on training in important life-saving topics like ACLS, the recommendations of which can apply to developing countries. Najafi Z et al.,[29] in a comparison study in Iran on the effect of education through video versus demonstration on fear of falling in nursing home residents, showed that higher efficacy of the demonstration training method compared to the video method in reducing the fear of falling in the elderly. Sopka S et al.,[30] opined that peer video feedback could achieve comparable results as instructor-based training methods and was easy- to apply and cost-efficient.

Limitations and recommendation
1. Single Centre study
2. Quasi-randomized sampling
3. Long-term retention of knowledge and skills were not measured.

All teaching institutions must adopt DOAP and VAL in the Medical Curriculum with ongoing system evaluation and modifications.

The stakeholders must provide the infrastructure and amenities for the implementation of such methods.

The VAL if properly designed and developed, is suitable in resource-limited scenarios, especially in developing countries with limited faculty as it is cost-effective, repeatable, and learner-friendly.

Further research in this field is recommended to streamline the methods to achieve the goal of NMC to bring out skilled and competent Indian Medical Graduates.

Conclusions
1. Both DOAP and VAL are effective teaching/learning methods, in imparting knowledge, skills, and attitude, and with positive feedback perception from medical interns.
2. The DOAP and VAL can be used complementary to each other with initial DOAP and subsequent VAL for refresher learning.
3. The VAL, as a student-directed small group learning method, if properly designed and developed, is suitable in resource-limited scenarios, especially in developing countries as it is cost-effective, repeatable, and requires fewer faculties.
4. The attitude of medical interns towards ACLS improves with knowledge and skills.

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Ethical approval and informed consent
Ethical approval has been granted by the hospital ethics committee (no. 108/2019/IEC/*Institute* Dated 30/12/2020) and all participants gave written informed consent.

Declaration of participant consent
The author certifies that he has obtained all appropriate participant consent forms. In the form, the participants have given their consent for their images and other clinical information to be reported in the journal. The participant understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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