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Comparing Effectiveness of Video-Assisted Oral Debriefing versus Oral Debriefing Alone During Human Resuscitation Simulation: A Randomized Trial

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Abstract

Aim of the study: Debriefing is central to simulation-based education. As its optimal format is unknown, video-feedback may optimize the learning process. The purpose of the study was to evaluate the potential benefits of video-assisted oral debriefing (VAOD) versus oral debriefing alone (ODA) for improving performance in a Basic Life Support with an Automated External Defibrillator (BLS/AED) scenario.

Methods: One hundred and forty candidates (physicians and nurses) were enrolled in the study. After performing a pretest scenario, participants were randomized into two groups to receive a facilitated debriefing: either ODA or VAOD. Participants were then asked to complete a posttest scenario. Pre- and posttests were video recorded to allow a blinded independent reviewer to rate each participant's skills in both tests, using the European Resuscitation Council BLS/AED provider assessment record tool.

Results: Overall BLS/AED resuscitation performance scores improved in both groups [mean (SD), 57.08% (1.77%) for ODA pretests vs. 89.77% (2.15%) for ODA posttests ($p<0.001$); 64.31% (2.54%) for VAOD pretests vs. 91.15% (3.08%) for VAOD posttests ($p=0.06$)]. Score improvement was not found to be very different between the two groups (+33% for ODA vs. +27% for VAOD, $p=0.06$).

Conclusion: Using VAOD in human resuscitation simulation did not show any advantage over ODA and did not enhance its impact on the participants' perception. However, our results suggested that the use of a debriefing process (either oral or video-assisted) contributes to a significant improvement in resuscitation skills.

Keywords: Oral; Physicians; Nurses; Randomized trial

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Introduction

High fidelity simulators for clinical simulation have been used for decades in many health educational programs. While simulator technology is constantly improving, getting closer to reality, learning techniques have evolved only slightly [1]. The authors nevertheless agree that debriefing is the key and therefore the essential step of a successful simulator learning session [2,3]. This allows an opportunity to clarify the learner's knowledge and rationale for actions during the simulation experience [4]. Its approaches aim to improve learning, future performance and ultimately patient outcomes. Traditionally, oral debriefing sessions have immediately followed the simulation scenarios as a

method for students to connect theory to practice and therefore develop clinical judgment [5]. The ideal format for debriefing remains debated [6]. Although essential, the literature remains scant, and modalities are not yet fully defined, even if guidelines for good practice exist [7]. Recently, some studies have suggested that the use of video recordings of the simulation might enhance debriefing sessions by stimulating learning and discussion based on an accurate account of events [8] and that self-reflection of video-recorded scenarios is beneficial to develop clinical judgment [5]. Indeed, video-assessed debriefing provides concrete and objective material on which the candidate can rely for reflection-on-action, linking theory and practice on the simulator, and allowing the detection of possible errors. For many students, viewing their own simulation video replay piques their interest, engages them and can contribute to greater learning. Although the benefit of such a tool seems intuitively promising, the results of the few studies carried out in the field remain equivocal [9].

Research Methodology

We conducted a prospective two center study to evaluate the potential benefits of video-assisted oral debriefing (VAOD) against oral debriefing alone (ODA) for improving performance in a Basic Life Support (BLS) with an Automated External Defibrillator (BLS/AED) scenario **(Table 1)** [10]. We enrolled 140 adult candidates (31 physicians and 109 nurses) from two Belgian hospitals: The Centre Hospitalier Universitaire Université catholique de Louvain Namur site Godinne, located in Yvoir, and the Clinique Notre-Dame de Grace, located in Gosselies **(Figure 1)**. The exclusion criteria were the physical inability to perform resuscitation and the refusal to be filmed. Participation is voluntary, 4 people refused to contribute. All subjects had received cardiopulmonary resuscitation training with a single rescuer before their academic or professional career. For this study, a high-fidelity simulator (Laerdal's SimMan®) was programmed to mimic a ventricular tachycardia (VT)/ventricular fibrillation cardio-pulmonary arrest (CPA). This simulator has the capability of reproducing human functions including pulse, respiration, lung sounds, and speech. Faced with this CPA, the candidate had to perform adult basic life support (BLS) with an automated external defibrillator (AED) resuscitation maneuvers in accordance with the European Resuscitation Council (ERC) guidelines [11] which were taught to them during their medical or nursing studies. After performing a 5-minute pre-test scenario

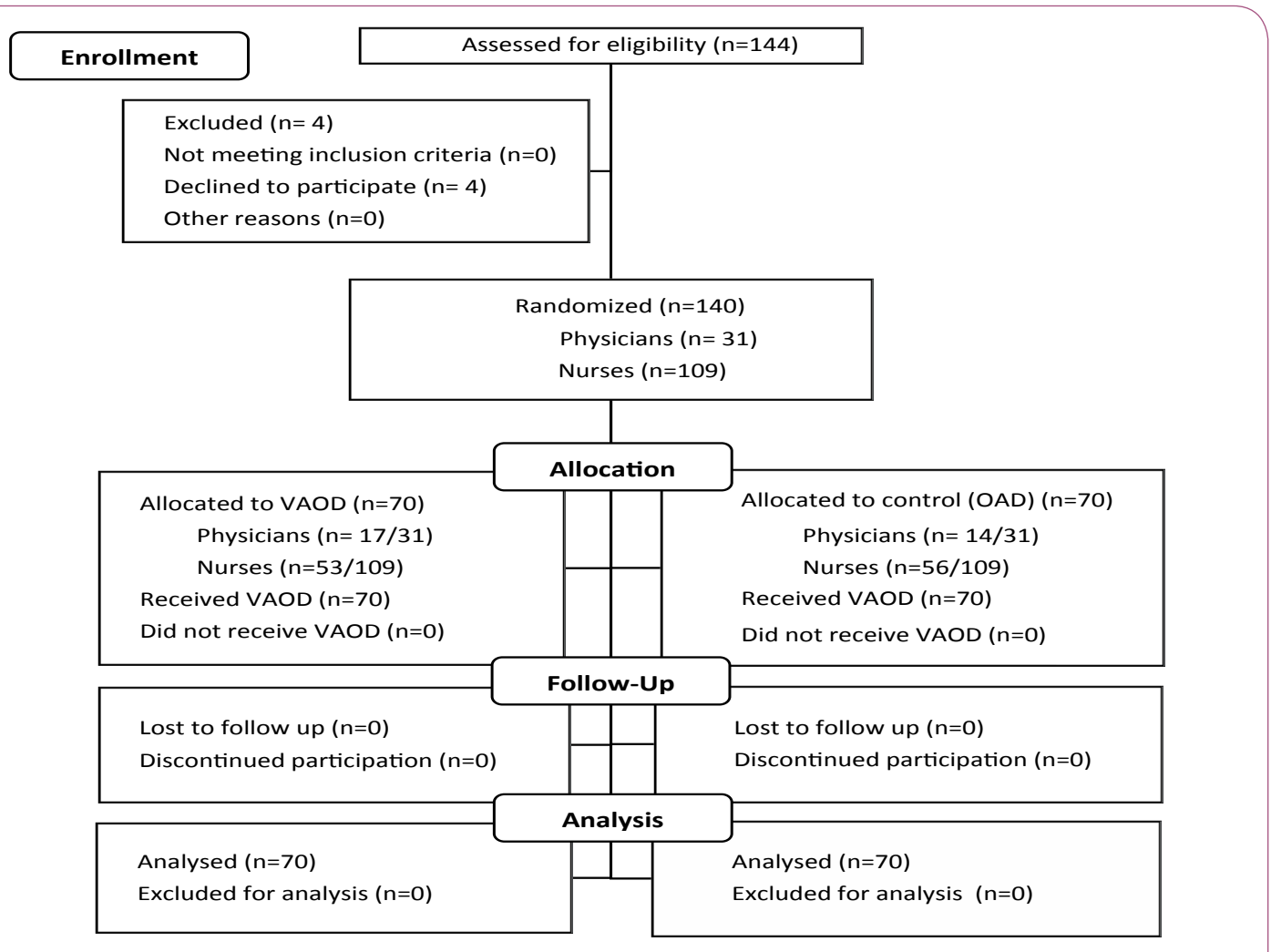

Figure 1 Consort flow diagram.

without theoretical recall, each participant was randomized to receive an immediate facilitated debriefing: either a VAOD or an ODA. Immediately after this test, each participant randomized in the VAOD group reviewed with the instructor the entire video-replay of his passage on the simulator, at real speed, with playback of marked sections (vagueness, difficulties or mistakes). At each stop, the instructor interviewed the candidate on the accuracy of his action (self-review), made a theoretical recall of the ERC's BLS recommendations and answered any questions. The debriefing, which lasted 20 minutes, whether video assisted or not, was carried out by the same instructor, who is an ERC course director. Participants were then asked to complete a post-test scenario lasting 5 minutes; this final test was the same that the pre-test scenario. Both tests were video recorded to allow in a second time the same blinded independent reviewer to rate subsequently each participant's skills in both pre- and post-test videotapes, using the ERC BLS/AED provider assessment record tool (Appendix A1), which is a 13-element scale that is an integral part of the BLS European course and validated as a training evaluation tool, to rate participants' performances from 0/13 to 13/13. All candidates provided written consent for participation in this study in accordance with local ethics committee requirements.

Statistical Analysis

Sample size was prospectively determined with preliminary data. It appeared that at least thirty individuals should be included in each group in order to detect an effect size of 0.85 (2 points with a standard deviation of 2.35) with 90% power and 95% confidence if such effect really exists. A linear mixed model was used to compare baseline score as well as progressions of scores in both groups. The score was the dependent variable while the period (pre or post), the group (ODA or VAOD) and their interaction were taken as independent fixed variables and individual was included as a random variable. A t-test was used to compare baseline levels between nurses and physicians. All analyses were performed with R 3.3.2 (R Foundation for Statistical Computing, Vienna, 2016) and the *nlme* package.

Results

70 candidates were included in each arms of the study. We evaluated pre- and posttests according to the 13-item scale ERC BLS/AED provider assessment record tool, using linear mixed regression statistical tests. Overall BLS/AED resuscitation performance scores improved in both groups [mean (SD), 7.42/13=57.08% (0.23=1.77%) for ODA pretests vs. 11.67/13=89.77% (0.28=2.15%) for ODA posttests (p<0.001); 8.36/13=64.31% (0.33=2.54%) for VAOD pretests vs. 11.85/13=91.15% (0.40=3.08%) for VAOD post-tests (p<0.001)] **(Table 2 and Figure 2)**. Baseline scores were slightly better for VAOD group than ODA group (respectively 64% vs. 57%, p=0.004) but progression of score were similar between both groups (respectively +27% vs. +33%, p=0.06). Baseline performances of nurses and physicians did not differ (respectively 60.4% and 61.5%, p=0.77) **(Table 3).**

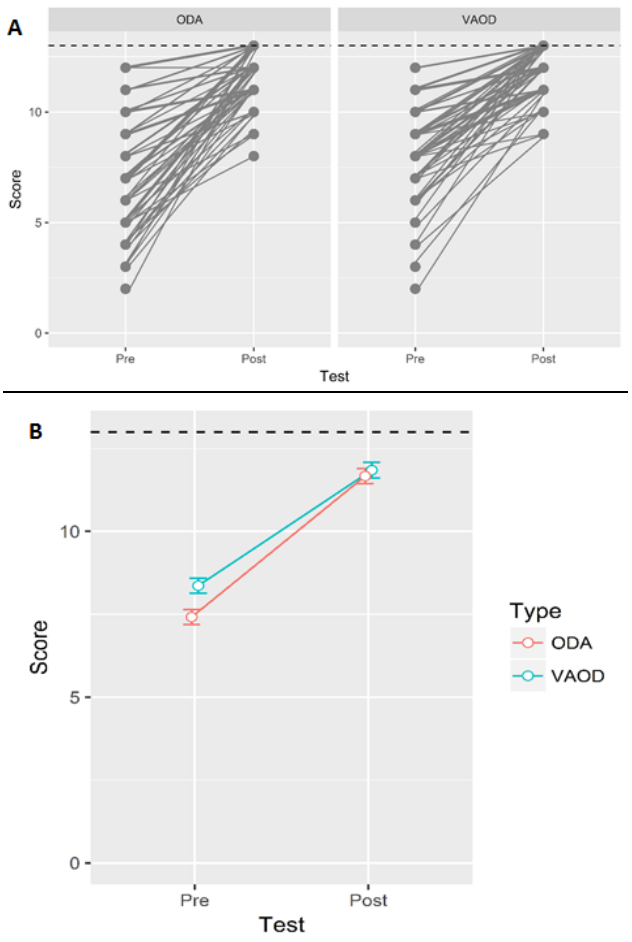

Figure 2 Representation of individual score changes (a) and mean +/- standard error (b).

Discussion

Compared to published studies, our trial had the largest number of participants (nurses or doctors) making it the largest study comparing the benefits of using video in simulation debriefing. Levett-Jones et al. [1] reported six studies [8,12-16] comparing VAOD with other types of debriefing methods. Grant et al. [8] conducted a pilot study to evaluate the effect of ODA versus VAOD on clinical performance indicators. The results demonstrated that the participants in the group exposed to VAOD were significantly more likely to demonstrate desirable behaviors concerning patient identification, team communication, and vital signs. A pilot study by Chronister and Brown [13] evaluated the effects of two debriefing styles with 37 undergraduate nursing students. The participants undertook a 30 min ODA (control group) or VAOD (experimental group) immediately after simulation experiences. The authors reported mixed results with participants in the experimental group demonstrating higher improvement in assessment and clinical skills related to cardiopulmonary resuscitation. However, improvements in mean knowledge retention scores from pre- to post-test were higher in the control group than in the experimental group. These results suggested that VAOD was more effective for nursing skills and response times, whilst knowledge retention was more positively

Table 1 Sim-PICO: Video-assisted oral debriefing against oral debriefing alone for improving performance in a BLS/AED scenario.

WHO (Debriefer)	WHAT (Methods/Content)	WHEN (Timing)	WHERE (Environment)	WHY (Theory)
Sim: Randomized, Controlled trial, Blinded review, Basic Life Support with an Automated External Defibrillator scenario. No industry funding.				
P: 140 adult candidates (31 physicians and 109 nurses)				
Two ERC instructors	**I:** Video-assisted oral debriefing	Debriefing immediately after a simulation case "test"	Skill center	Video-assisted oral debriefing
	C: Oral debriefing alone			Oral debriefing alone
O: ERC BLS/AED provider assessment record tool				

Table 2 Summary of scores with confidence intervals on mean and individual change (a). Linear mixed regression statistical test (b) evaluating the difference between the two type of debriefing in the pre-test (line 2), the increase in the ODA group (line 3) and the difference between the two groups (line 4) and confidence interval.

a)

Variables	Period	Std.Error	mean	CI 2.5%	CI 97.5%
ODA	T1	0.23	7.42	6.96	7.87
VAOD	T1	0.23	8.36	7.90	8.82
ODA	T2	0.23	11.67	11.21	12.13
VAOD	T2	0.23	11.85	11.39	12.31

b)

Variables	Period	Value	Std.Error	t-value	p-value	CI 2.5%	CI 7.5%
(Intercept)		7.42	0.23	31.98	0.0000	6.96	7.87
VAOD		0.95	0.33	2.89	0.0044	0.30	1.59
ODA	T2	4.26	0.28	14.97	0.0000	3.69	4.82
VAOD	T2	-0.77	0.40	-1.92	0.0571	-1.57	0.02

Table 3 Summary of scores (a) and Linear mixed regression statistical test (b) Evaluating the difference between the initial pre-test score according to the status (nurse or physician).

a)

Variables	Estimate	Std. Error	T value	Pr(> |t|)
(Intercept)	7.8532	0.2424	32.40	0.0000
Physician	0.1468	0.5151	0.28	0.7761

b)

Variables	Estimate	Std. Error	T value	Pr (> |t|)
Nurse	7.85	0.24	32.40	0.0000
Physician	8.00	0.45	17.60	0.0000

affected by ODA. In four studies [12,14-17], the addition of video playback did not offer any significant differences in improvements in outcomes when compared to ODA. In one study, [15] improvement tended to be lower in the VAOD debriefing group than in the ODA group. Intuitively, we would think that VAOD should improve the debriefing as it offers an accurate portrayal of events [3]. Indeed, the video recording reflects the reality of the simulation session, objectively, without the filter of the view of the instructor. However, the use of video may distract participants from focusing on learning objectives [13] and so they may be less attentive to the instructor's explanations. Because debriefing sessions were of the same duration, it is possible that participants who received video-facilitated debriefing received less verbal feedback as some portion of the time was spent watching the appropriate sections of the video [1]. We found several limitations in our study. First, the size of the sample may be insufficient, secondly, the two groups did not start from the same point (7.42/13 for the ODA group and 8.36/13 for the VAOD group) but reached approximately the same level (respectively 11.67/13 and 11.85/13). As a result, the progression is a little less for the VAOD group. This can be explained by the fact that the scores are already high and cannot exceed the maximum of 13. Furthermore, our study involving both nurses and physicians showed that their basic levels in BLS resuscitation skills were equal. Finally, the debriefing was done by the same person may be a limitation of the study as well [15-17].

Conclusion

To conclude, video-assisted oral debriefing (VAOD) in simulation after cardiopulmonary arrest offers no statistically significant educational advantages over oral debriefing alone (OAD) and therefore other factors must be taken into account when considering this approach. In our increasingly image-based society this is an interesting finding because it goes against the current trend of making audio-visual technology a learning tool. One must also consider the extra costs of video recording equipment and the cost of training academic and technical staff to competently use such equipment during for debriefing. If the contribution of the video to the education is not obvious, investing in infrastructure may not be justified. However, our results suggest that the use

of a debriefing process, regardless of the method used, offers a significant improvement in the resuscitation skills and should be included as an integral component of all simulation learning experiences. Further research will be needed to assess the effects of video-assisted oral debriefing in adult Advanced Life Support simulation scenarios and its impact on learners' behavior.

Financial Disclosure Summary

All authors have completed the ICMJE uniform disclosure form and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Conflict of Interest

No conflict of interest as conditions mentioned in the above statement. This study was conducted in accordance with the Declaration of Helsinki.

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