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Unethical leadership can lower the quality in resuscitation teams: a randomized simulation study

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Abstract: **Objective:** The aim of this study was to evaluate whether verbal pressure from the team leader distracted students during a critical care simulation scenario. Particularly, examining the influence of unethical leadership on CPR quality was the objective of this work.
Methods: Eighty students were randomized into study (n=40) and control group (n=40). They participated in a short cardiac arrest simulation scenario, each one separately. The scenario consisted of two tasks. Firstly, they were asked to bring to the team leader one ampule of a particular drug. A variety of drugs in their original packaging were placed on a shelf, but the handicap of this task was that the ampullae were mixed up between boxes. The second task was to perform 30 good-quality chest compressions. Study group participants were experiencing verbal pressure during the first part.
Results: Study group participants fulfil the first task faster (require less time to bring the ampulla), but fewer of them find out that medications are mistaken (in comparison with the control group). Moreover, the study group reports higher stress levels (as assessed in 1 - 10 scores), and more participants perform too fast chest compressions (faster than 120 times per minute) in this group.
Conclusion: Verbal pressure from a team leader increases participants' stress levels and decreases their effectiveness (chest compression quality and the ability to identify that ampullae are mistaken).

Keywords: Resuscitation; Simulation; Unethical Leadership; Verbal Pressure

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1. Introduction

Physicians are often confronted with difficult situations that cause high levels of stress. As acute stress can adversely affect doctors' health and patient safety, the issue of stress and stress management in the medical profession is an important one (1). Patient care is closely linked to the psychosocial work environment, which is influenced by organisation, workplace management, type and amount of work tasks and social relationships.

The psychosocial work environment is an important contributor to errors and adverse events in hospitals. Healthcare professionals are the group at risk of experiencing work-related emotional stressors arising from communication and collaboration (2-4). Verbal pressure from co-workers and superiors, especially in difficult situations requiring quick decisions, adds to the stress of having even less time to make the right decisions, leading to deterioration in the medical care provided (5).

The Mini-COPE questionnaire assesses the response to severe stress in a difficult situation. It contains 28 questions, and each question is scored on a scale of 0 to 3 points, which allows the intensity of the use of a particular strategy to be determined. The questions in the questionnaire cover strategies such as active coping, planning, positive re-framing, acceptance, religion, humour, use of emotional support, use of instrumental support, distraction, denial, venting, substance use, behavioural withdrawal, and self-blame (6).

The aim of this study was to evaluate if verbal pressure made by the team leader distract students during critical care simulation scenario. Particularly, examining the influence of unethical leadership on cardiopulmonary resuscitation (CPR) quality was the objective of this work.

2. Methods

2.1. Study design

Eighty paramedic and nursing students from Powiślański University (Poland) who signed written consent were recruited. All of them participated previously in a cardiopul-

monary resuscitation course during their medical education. Firstly, participants were asked to fill out a survey with demographic data and the Mini-COPE questionnaire in Polish adaptation. Strategies were grouped into 4 categories (mean results were obtained): active (active coping, planning, positive revaluation), seeking support (looking for emotional support, looking for instrumental support), avoidant (dealing with something else, denial, emotional discharge), and helplessness (substance use, discontinuation of action, blaming oneself). Acceptance, humour on turning into religion, are not part of any strategy subgroup (7). Subsequently, students took part in a short cardiac arrest low-fidelity simulation scenario, each one separately. Just before the task, each participant was randomized with a simple random number generator into a study or a control group. The scenario consisted of two tasks. Firstly, they were asked to bring to the team leader one ampulla of a particular drug. A variety of drugs in their original packaging were placed on a shelf, but the handicap of this task was mixed up ampullae between boxes. Inside the box from the front (of the desired drug), there was a blister of other drug ampoules (with the same volume and size as the expected one). Thus, to bring the proper ampulla, there was a need to check another package from the row (behind the mistaken one) in which the demanded medication was present. The time of this part was being measured. The second task was to perform 30 good-quality chest compressions. Parameters of chest compressions, such as frequency (number/minute), mean depth, and percentage of leaning, were checked with the manikin Prestan 2000 combined with the mobile CPR Feedback App. Students from both groups took part in the same scenario, but the study group participants were experiencing verbal pressure made by the team leader during the first part of the scenario with words ‚hurry up!', ‚faster!', ‚come on!', while the control group ones were acting without any distractor. The team leader was the same person for all participants during the study. At the end of the scenario, participants evaluated their stress level on a 1-10 scale (1=no stress; 10= maximal stress).

The study protocol was revised by Bioethical Commission of Gdańsk Medical Chamber (Poland). The study was conducted in accordance with the Declaration of Helsinki (as revised in 2024).

2.2. Statistical analysis

As most data obtained from the study is non-parametric or does not meet the criterion of normal distribution (Shapiro-Wilk test, P-value<0.05), the following statistical tests were performed: U Mann-Whitney, rho Spearman's correlation, and chi-squared. Moreover, Principal Component Analysis (PCA) was performed. The data is presented as mean ± standard deviation (SD).

3. Results

The results for the study and control groups are presented in table 1. There is no significant difference between them in Mini-COPE questionnaire results. Study group participants fulfil the first task faster (require less time to bring the ampulla) but less of them find out that medications are mistaken (in comparison with the control group ones). Moreover, study group reports higher stress level (as evaluated in 1 - 10 scores) as well as there are more participants who perform too fast chest compressions (faster than 120 times per minute) in this group. Helplessness strategy group subscale correlates with self-reported stress evaluated in the end of the scenario (rho=0.300; P-value=0.008). There is a positive correlation between age and chest compressions rate (rho=0.286; P-value=0.01). Participants who deliver correct medication are significantly older than those who bring incorrect ampulla (33.72 ± 8.17 versus 28.19 ± 9.23; P-value=0.016) with no significant differences in stress coping strategies levels. Helplessness strategy group is at lower level among students who perform their chest compression too slowly (below <100/min.) in comparison with participants who perform CPR with rate at least 100/minute (0.42 ± 0.39 versus 0.75 ± 0.64; P-value=0.022).

Among control group participants those who delivered the correct ampulla have higher results in 'turning into religion' stress coping strategy in comparison with those who brought incorrect medication (1.27 ± 0.97 versus 1.06 ± 0.82; P-value=0.036). They also require more time for this part of the scenario (34.8 ± 20.0 versus 13.2 ± 7.87; P-value < 0.001). Moreover, in control group, there is a positive correlation between time and 'turning into religion' coping strategy (rho = 0.361; P-value=0.024) as well as time and 'active strategies group' subscale (rho = 0.327; P-value =0.042). Chest compressions rate correlates significantly with 'seeking support strategies group' subscale among control group participants (rho=0.351; P-value=0.028). All above findings are not present in the study group.

Principal components analysis (PCA) was made to check if there is a reliable model describing the impact of stress coping strategies on students' performance. In fact, no significant result was found for coping strategies, but the statistics revealed possible interesting findings for parameters of students' performance. Two significant components are present with cumulative percentage of variance 71.3%. Coordinates are presented in table table 2. The test significantly distinguishes study and control groups which prove that participants' performance during the scenario is different in both groups. Graphical presentation is shown in figure 1.

4. Discussion

According to Lazarus and Folkman, stress coping is a cognitive and behavioural process for dealing with external, internal or combined stressors that act as a nuisance or overtax internal resources (8).

Table 1 Comparison of study and control groups

Feature		Study (n= 40)	Control (n=40)	P-value
Mini-COPE	Active coping	2.189 ± 0.76	2.231 ± 0.56	0.762
	Planning	2.000 ± 0.77	1.910 ± 0.77	0.571
	Positive revaluation	1.770 ± 0.72	1.539 ± 0.69	0.182
	Acceptance	1.811 ± 0.71	1.795 ± 0.63	0.789
	Humour	0.987 ± 0.74	0.932 ± 0.77	0.754
	Turning into religion	0.905 ± 0.98	0.859 ± 0.91	0.931
	Looking for emotional support	1.649 ± 0.80	1.654 ± 0.69	0.884
	Looking for instrumental support	1.649 ± 0.72	1.692 ± 0.80	0.724
	Dealing with something else	1.514 ± 0.67	1.718 ± 0.68	0.272
	Denial	0.595 ± 0.56	0.551 ± 0.56	0.728
	Emotional discharge	1.257 ± 0.71	1.128 ± 0.69	0.403
	Substance use	0.405 ± 0.76	0.385 ± 0.74	0.899
	Discontinuation of action	0.473 ± 0.58	0.346 ± 0.55	0.192
	Blaming oneself	1.162 ± 1.01	0.974 ± 0.81	0.543
	Strategy group: active	1.981 ± 0.65	1.890 ± 0.48	0.187
	Strategy group: seeking support	1.695 ± 0.71	1.670 ± 0.69	0.937
	Strategy group: avoidant	1.124 ± 0.52	1.131 ± 0.51	0.851
	Strategy group: helplessness	0.692 ± 0.61	0.574 ± 0.66	0.402
Other parameters	Age (years)	30.20 ± 9.75	28.68 ± 8.77	0.470
	Field of study: nursing	13 (32.5 %)	16 (40 %)	0.485
	Field of study: paramedics	27 (67.5 %)	24 (60 %)	
	Time (s)	9.45 ± 4.25	20.7 ± 16.8	< 0.001 *
	Delivered drug: correct	4 (10%)	14 (35%)	0.007 *
	Delivered drug: incorrect	36 (90%)	26 (65%)	
	Chest compressions rate (/minute)	110.8 ± 17.4	106.1 ± 15.0	0.240
	Chest compressions mean depth (cm)	5.96 ± 0.57	6.14 ± 0.22	0.418
	Leaning (%)	3.75 ± 7.82	6.58 ± 14.3	0.184
	Chest compressions rate: > 120/min.	13 (32.5 %)	5 (12.5 %)	0.032*
	Chest compressions rate: ≤ 120/min.	27 (67.5 %)	35 (87.5 %)	
	Chest compressions rate: < 100/min.	11 (27.5 %)	16 (40 %)	0.237
	Chest compressions rate: ≥ 100/min.	29 (72.5 %)	24 (60 %)	
	Self-reported stress (1 - 10 scale)	2.90 ± 1.77	2.48 ± 1.24	0.034 *

P-value obtained from U Mann-Whitney test and chi-squared statistics.

Table 2 Principal Components analysis (PCA)

		Dim. 1	Dim. 2
Variance %		43.2	28.0
Coordinates	Time	0.603	- 0.529
	Chest compressions rate	0.112	0.898
	Chest compressions mean depth	- 0.838	- 0.124
	Leaning	0.808	0.143
Link between the variable and categorical variable (group)	Study	- 0.392	0.293
	Control	0.392	- 0.293
	P-value	0.007	0.013

There are 14 different stress management strategies that include coping strategies such as: active coping, planning, positive reinterpretation, acceptance, humour, turning to religion, seeking instrumental social support, seeking emotional social support, mental disengagement, denial, focusing on and venting emotions, substance use, behavioural disengagement and self-blame (9).

These can be grouped into four main stress management strategies (groups): active coping (which refers to problem-focused coping styles that aim to reduce or eliminate the stressful properties of the problem), avoidant coping (ignoring, escaping stimuli); helplessness and support-seeking (focus on emotions that helps to control the emotional response associated with the stressor) (9-11).

Active strategies, including planning, positive reappraisal and active coping, correlated with high psychological resilience in doctors in the study (12).

Importantly, active coping strategies were associated with lower job burnout (13). Acceptance, positive reframing, humour, planning and active coping were correlated with lower levels of perceived stress (14).

Choosing the right coping strategy to manage stress is important both for occupational functioning to reduce negative outcomes and for individual health (8,10).

Stress can have both positive and negative effects on the medical procedures performed. In one study, participants performed better when under pressure because it motivated them more (5).

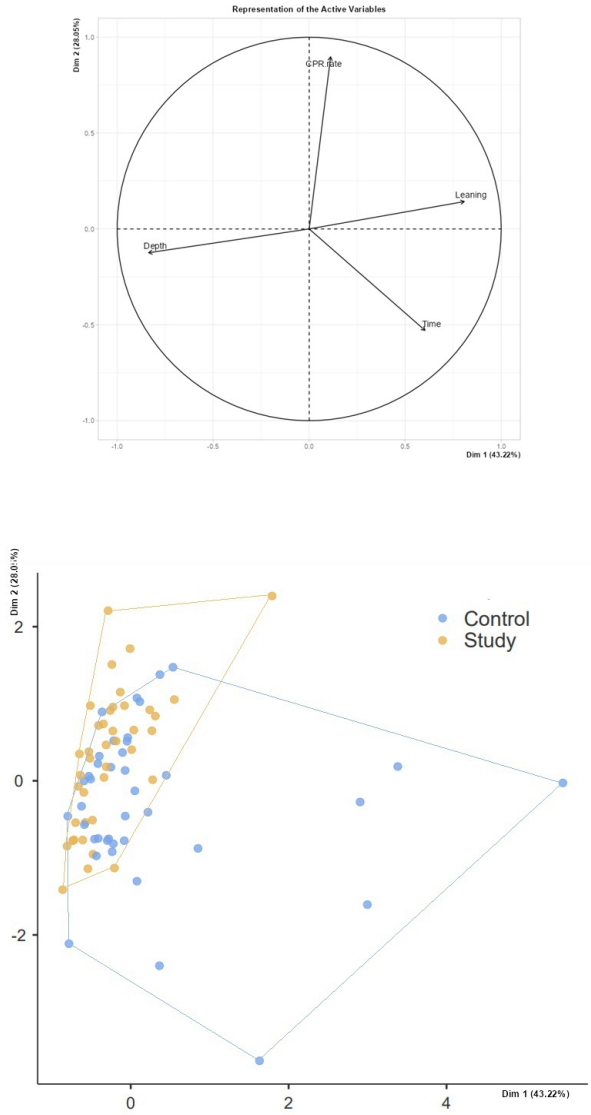

Figure 1 Graphical presentation of PCA

In contrast, another article points out that during mental stress, the cognitive system is in danger of being overloaded which impairs attentional resources. As a result, participants may be more susceptible to distraction and focus only on selected items, neglecting other presumably relevant information (15). It is also worth noting that long-term exposure to stress affects mental health, which has a direct impact on impaired performance and quality of work. Moreover, pressure in the workplace can contribute to physiological problems such as insomnia or musculoskeletal symptoms, which translates into impaired physical and mental strength. These strengths help maintain good performance at work (16).

The stress factor should therefore be addressed individually because it can both motivate performance but can also be a cause of reduced effectiveness at work (5,15,16).

In our study verbal pressure made by the team leader influences students' performance. They rarely notice that the medication is mistaken, they perform worse CPR which could relate to higher self-reported stress level. Even if each person who administer a drug into patient's body is obliged to check the ampulla 3 times, the incorrect delivery of drug could confuse and delay the time to correct drug administration. Thus, our study does not check a direct correlation of verbal pressure and medication errors. Nevertheless, higher incidence of incorrect ampulla delivering is a prove that verbal pressure made by team leader is a significant distractor for students. There are numerous tasks in critical care which require high level of focusing and precision.

5. Limitations

The most relevant limitation concerns duration of chest compressions (only 30 instead of 2 minutes full advanced life support loop). Nevertheless, such a short study is sufficient to show significant differences in effectiveness. Moreover, there is a need for more research which show how verbal pressure affect medical professionals (not students).

Summing up, this work proves that unethical leadership could be a distractor which worsens students' performance during critical care simulations. What is interesting, effect of verbal pressure made by team leader is extended in time and reduces the quality of CPR, even if the stressor is not present anymore. It means that even a short period of pressure could affect the whole scenario. There is a need for further studies in this field, but we do not recommend rushing our coworkers especially during emergency medical situations.

6. Conclusion

Performance of critical care team members could be affected negatively, if they experience verbal pressure (rushing up) made by the team leader. This effect is not limited only to the task, which is done under the pressure, since the quality of chest compressions being done by study group members is worsen (even if the stressor is not present in this part). Verbal pressure increases the level of self-reported stress.

7. Declarations

7.1. Acknowledgement

We would like to express our gratitude to the study participants.

7.2. Authors' contribution

All authors contributed to this manuscript equally.

7.3. Conflict of interest

We declare no conflict of interest.

7.4. Funding

No financial aid was obtained.

7.5. Ethical considerations

The study protocol was revised by Bioethical Commission of Gdańsk Medical Chamber (Poland) - decision number KB - 39/24. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013).

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