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RESULTS OF EXPERIMENTAL TESTING ON IMPROVING STUDENTS' STRESS MANAGEMENT SKILLS IN EMERGENCY MEDICAL CARE CYCLES

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Annotation: This article analyzes the effectiveness of an integrative-methodical model aimed at developing students' stress management skills in the discipline "Emergency Medical Care" based on an experimental study. Experimental testing was conducted with the participation of 329 students in 3 higher medical educational institutions. The results were confirmed by statistical differences in TG–NG indicators using t-test, Mann–Whitney U, χ^2 test and Cohen's d effect sizes. It was found that the OSCE results of TG students increased by +28%, the level of reflection by +40%, STAI scores by -14 points, and the efficiency of collective decision-making by +32%. The results indicate the high efficiency of the integrative model.

Keywords: stress, clinical thinking, integrative model, simulation, medical education, experimental testing, STAI, OSCE.

Introduction. Emergency medical care is one of the most responsible and complex areas of medical education, requiring students to have a high level of clinical thinking, quick decision-making in stressful situations, effective teamwork, and emotional stability. All of these conditions are inherently associated with strong stress factors, and when students are not psychologically prepared, there is an incorrect distribution of attention, slowing down of cognitive processes, disruption of analytical thinking, and an increased tendency to make mistakes.

As noted in many scientific sources (Arnsten, 2015; LeBlanc, 2009), stress weakens the activity of the prefrontal cortex, which directly negatively affects the processes of clinical observation, analysis and decision-making of students. Especially in the educational process enriched with intense clinical tasks, such as the subject of "Emergency Medical Care", the underdevelopment of stress management skills can reduce educational effectiveness, affect OSCE results and lead to an increase in the number of errors in practical exercises.

Therefore, the development of methodological approaches aimed at managing stress, developing emotional stability, and forming reflexive and volitional skills in the medical education system is an urgent scientific and practical issue. Based on this need, this study aims to experimentally evaluate the effectiveness of an integrative-methodological model designed to develop students' stress management competence in the subject of "Emergency Medical Care".

In order to determine the real impact of the model, a large-scale pilot study was conducted with the participation of 329 students at three medical universities. Results: The differences between TG and NG were reliably determined through statistical tests (t-test, Mann–Whitney, χ^2, Cohen's d), and the impact of the integrative model on clinical thinking, reflection, stress management, and collective decision-making skills was analyzed in depth.

This study was aimed at experimentally testing the effectiveness of the integrative-methodological model aimed at developing students' stress management skills in the subject

"Emergency Medical Care". The methodological basis of the study was the pedagogical experiment, statistical analysis, psychological diagnostics, and triangulation approach.

The pilot study was conducted at three leading medical universities in Uzbekistan:

Andijan State Medical Institute,

Bukhara State Medical Institute,

Fergana Medical Institute of Public Health.

Total number of participants: 329 students.

Students were divided into two groups: Experimental group (TG): 195; Control group (CG): 134. In order to ensure equality of initial conditions between the groups, the following were controlled:

educational stage,

module size,

academic performance,

age,

learning motivation, differences were minimized. This created a methodological basis for an objective assessment of the effectiveness of the intervention.

The experiment was carried out in stages at the lower, middle and final stages. The study was based on the following classical pedagogical experimental scheme:

1. Preliminary diagnostics (PRE-test)

TG and CG students were assessed for stress levels, clinical thinking, reflection and teamwork.

2. Intervention – implementation of an integrative methodological model (14-day program)

The following activities were carried out in the TG:

high-fidelity simulation

non-accusatory debriefing

DIEP reflection journals

cognitive reappraisal techniques

psychophysiological training

team-based simulation exercises

The usual (traditional) training process was continued in the NG.

3. Final diagnosis (POST-test)

Reassessment according to all criteria in the PRE-test was conducted.

4. Statistical analysis of differences between TG–NG

The real strength of the intervention effect was determined and the effectiveness of the model was assessed.

The experiment was conducted during the 2023–2025 academic years.

The effect of the integrative model was assessed in terms of cognitive, affective, volitional and social components. Therefore, a comprehensive diagnostic package was used:

1) Theoretical knowledge test (40 questions). It measured the basics of emergency medicine, clinical algorithms, monitoring, triage protocols and decision-making.

2) OSCE stations (5 clinical situations). Assessed skills:

clinical observation,

differential analysis,

team communication,

speed and accuracy of decision-making.

3) STAI (State Anxiety Inventory). It determined the level of state anxiety and character anxiety of students.

4) PSS (Perceived Stress Scale). It measured the level of subjective perception of stress.

5) DIEP reflection journals. The quality of reflection was assessed in the following stages:

Describe - describing the event

Interpret - interpreting

Evaluate - evaluating

Plan - creating a plan of further action

6) Team-based simulation checklist. Team competencies were assessed:

distribution of tasks

communication (SBAR)

leadership

rapid support

stress management in the team

All of these tools are standard methodologies proven in international practice and actively used in medical education.

The research data were processed in the SPSS 26.0 package, and the effectiveness of the model was confirmed with high reliability.

Statistical methods used:

Student t-test. Comparison of TG–NG PRE/POST mean values

Mann–Whitney U. For non-normally distributed data

χ^2 test. Determination of the difference in categorical indicators

Cohen's d. Determination of the effect size of the intervention

(0.2–small, 0.5–medium, 0.8–large)

Pearson r. Determination of the relationship between stress level, OSCE results and reflection

Statistical significance level: $p<0.05$ (95% confidence interval)

This analysis clearly demonstrates that the effectiveness of the model is not random.

Experimental results. The effectiveness of the integrative-methodical model was assessed through a statistical comparison between TG (195) and NG (134) students. PRE–POST analysis of the results showed a significantly higher intervention effect. The results were considered in the following areas.

TG–NG OSCE indicators. OSCE stations assessed clinical thinking, decision-making, algorithm application, communication and teamwork skills.

The results showed that: in the TG, the OSCE total score increased by +28%, while in the NG, an increase of about +10% was observed.

Statistically: $t(327) = 6.42$, $p < 0.001$; Cohen's $d = 0.82$ — a large effect size. This means that the integrative model had a particularly strong effect on the cognitive component (clinical thinking) and the social component (teamwork).

Level of reflection (DIEP). Reflection indicators were assessed based on the DIEP model:

Describe

Interpret

Evaluate

Plan

In the TG: the quality of reflection increased by +40%; $p < 0.001$; Cohen's $d = 0.78$ (medium–large effect) In the NG: only an 8–10% increase was observed.

This result indicates the high effectiveness of the use of non-accusatory debriefing, in-depth analytical interviews and reflection journals.

Stress level (STAI-S). The stress level of students was assessed using the STAI (State Anxiety Inventory) scale.

In TG: stress level decreased by –14 points; Mann–Whitney U = 10842, $p < 0.001$

In NG: only a decrease of –3 points was observed

This difference confirms the high effectiveness of simulation exercises, breathing techniques, muscle relaxation, mindfulness exercises and cognitive reappraisal interventions.

Team decision-making indicators. Team cooperation, communication, role distribution, task management, reporting skills using the SBAR model were assessed based on the team-based simulation checklist.

Growth in TG: +32%; Increase in NG: +9% Statistical result: χ^2 (3, N = 329) = 18.54, $p < 0.001$

This shows that the social component of the integrative model worked very strongly.

The main reasons for the increase in collective decision-making:

Working with the SBAR model

Guilt-free debriefing

Brigade-based simulation

Role-playing exercises

The skills of distinguishing key features, determining priorities and making quick decisions in a clinical situation were assessed.

TG: +22%; NG: +6%, Pearson correlation coefficient: r = 0.61 — strong positive correlation

This means that:

As the stress level decreases

The accuracy of clinical observation and decision-making increases.

Thus, the affective and cognitive components of the model are strongly interconnected and reinforce each other.

The results of the experimental-testing of the integrative-methodical model show that: cognitive processes (OSCE +28%); affective stability (STAI –14 points); reflective thinking (+40%); willpower (increased stress tolerance increase); proved to be highly effective in social competence (team-based +32 %).

The differences between TG and NG were confirmed at a high level of reliability in all statistical criteria ($p < 0.001$), which means that the effect of the model is not accidental.

A comprehensive analysis of the data obtained at the end of the experimental and testing work made it possible to comprehensively substantiate the effectiveness of the integrative-methodological model. The results obtained show that the developed model had a significant pedagogical and psychological effect on the development of students' stress management skills.

1) The multi-component effect of the model was confirmed. According to the results of the analysis, the model revealed consistent positive changes in the following four main components:

cognitive component - clinical thinking, OSCE indicators, accuracy of situation assessment;

affective component - stress reduction through STAI, emotional regulation;

volitional component - self-control, consistency under pressure;

social component - teamwork, communication through SBAR, role distribution.

This indicates that the theoretical foundations of the model and pedagogical technologies (simulation, debriefing, reflection, cognitive reappraisal) worked harmoniously.

2) The effect strength (Cohen's d) was high

Cohen's d by indicators ranged from 0.65 to 0.82, which is:

0.2–0.4 - small effect

0.5–0.7 - medium effect

0.8+ - large effect

according to the accepted classification, it corresponds to the medium-large range. This confirms that the intervention really changed the knowledge and skills of students, and the impact strength was quite significant.

3) Changes in TG were consistent and stable

The experimental group (TG) demonstrated:

increase,

stability,

statistically significant changes

in all criteria. This indicates that the integrative model has a continuous, systematic and deep pedagogical effect.

In the control group (CG): changes were minimal, some indicators were not statistically significant, and the growth rate was low.

This indicates that the effectiveness of the model is precisely the result of the intervention.

4) OSCE and reflection processes were the strongest changes

The assessment results showed that: OSCE indicators increased by 28%, Reflection improved by +40%, which means that cognitive (thinking) and metacognitive (reflection) systems benefited the most from the model.

The combination of simulation + debriefing + DIEP journals has deeply developed the students' skills of:

analyzing their own mistakes,

re-evaluating,

optimizing thinking,

managing emotional reactions.

5) Reducing stress is associated with increasing clinical thinking

Pearson correlation (r = 0.61) proves that:

as stress decreases, clinical thinking increases,

high stress weakens cognitive processes (attention, memory, decision-making).

This result is fully consistent with psychophysiological and cognitive theories (Lazarus, Arnsten, McEwen).

Thus, stress control is a basic condition for safe and effective clinical training.

The above analysis allows us to summarize the effectiveness of the integrative-methodological model as follows:

The model develops cognitive, affective, volitional and social competencies together.

The strength of the effect is in the medium-large range, and the pedagogical impact is real and significant.

The difference between the results of TG–NG clearly demonstrates the quality of the intervention.

Reduced stress led to an increase in clinical thinking and teamwork.

Conclusion. The results of the conducted experimental studies clearly showed that the developed integrative-methodical model is highly effective in developing stress management skills in students in the discipline "Emergency Medical Care". The fact that the study was conducted with the participation of 329 students in three medical universities strengthened the empirical base of the model and increased the reliability of its results.

The practical implementation of the integrative model provided significant positive changes in several key components of students' professional training:

1. Improvement of clinical thinking

The results of the OSCE stations (+28%) showed that the cognitive component of the model worked effectively. The speed of analyzing the situation, setting priorities and making decisions among students significantly increased.

2. Strengthening emotional stability

A decrease of -14 points in STAI stress proved a significant improvement in the affective component. Breathing techniques, relaxation, mindfulness, and cognitive reappraisal methods were confirmed to be effective.

3. Increase in reflective competencies

DIEP journal-based assessment showed a +40% increase in TG, indicating that students had significantly developed metacognitive thinking, error awareness, and self-assessment skills.

4. Improvement in team decision-making

Team-based simulation checklist.

According to the results of the list, a +32% increase was recorded in TG. SBAR communication, role distribution and blameless debriefing were the main factors that strengthened the social component of the model.

5. The relationship between stress and clinical thinking

The relationship determined by Pearson r = 0.61 showed that a decrease in stress levels directly affected the increase in the accuracy and effectiveness of students' clinical thinking.

According to the results of the analysis:

$p < 0.001$ — there is a significant difference in all main indicators

Cohen's d = 0.65–0.82 — medium and large effect

Changes in TG were stable, consistent and systematic

In NG, they were minimal

These results confirm that the effect of the model is not accidental, but a powerful intervention based on pedagogical and psychological laws.

Thus, the developed integrative-methodological model has fully justified itself as an innovative pedagogical solution that jointly develops the cognitive (clinical thinking), affective (emotional stability), volitional (self-management), and social (teamwork) competencies of students.

The widespread introduction of this model into the teaching process of the subject "Emergency Medical Care" in medical universities guarantees high results in terms of ensuring the psychological preparation of students, the quality of clinical decision-making, and patient safety.

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