



The impact of emotional intelligence of military leaders on the crisis management in wartime

El impacto de la inteligencia emocional de los líderes militares en la gestión de crisis en tiempos de guerra

Yevhenii Ishchenko^{1*} <https://orcid.org/0000-0002-5701-7829>

Iryna Yevchenko² <https://orcid.org/0000-0002-3204-5954>

Andrii Masliuk³ <https://orcid.org/0000-0002-0530-9969>

Serhii Myronets² <https://orcid.org/0000-0002-9185-3206>

Yevhen Potapchuk⁴ <https://orcid.org/0000-0001-7040-8456>

¹Interregional Academy of Personnel Management. Kyiv, Ukraine.

²State University of Trade and Economics. Kyiv, Ukraine.

³National Academy of Educational Sciences of Ukraine. G.S. Kostiuk Institute of Psychology. Kyiv, Ukraine.

⁴Khmelnyskyi National University. Khmelnytskyi, Ukraine.

*Author for correspondence. Email: yevheniiishchenko@yahoo.com

ABSTRACT

Background: The use of effective emotion management strategies, high stress resistance, and willingness to take risks are crucial for successful crisis management in wartime.

Objective: To study how the emotional intelligence of military leaders allows effective management of crisis situations during war.

Methods: Emotional Questionnaire Test, Questionnaire of Psychological resilience of Servicemen of the Armed Forces of Ukraine in the Conditions of Hostilities, The Social Readjustment Rating Scale,

<http://scielo.sld.cu>

<https://revmedmilitar.sld.cu>



Schubert Risk Propensity test, were applied. Descriptive analysis and regression analysis were used for statistical processing.

Results: It was found that emotional intelligence determines psychological resilience ($R^2= 0.746$, $\beta= 1.36$), stress resistance ($R^2= 0.721$; $\beta= 3.80$), risk-taking ($R^2= 0.746$; $\beta= 2.29$), that is, it contributes to effective crisis management.

Conclusions: Emotional intelligence is a prerequisite for the development of psychological resilience, stress resistance, and risk-taking, which ensure the effectiveness of leadership decision-making in wartime. Leaders with high emotional intelligence are able to act more effectively in crisis situations.

Keywords: crew resource management, healthcare; emotional intelligence; emotional regulation; resilience, psychological; psychological well-being; risk-taking.

RESUMEN

Introducción: El uso de estrategias eficaces de gestión de las emociones, alta resistencia al estrés y voluntad de asumir riesgos, son cruciales para la gestión exitosa de crisis en tiempos de guerra.

Objetivos: Estudiar el grado de impacto de la inteligencia emocional de los líderes militares, sobre la eficacia de la gestión de crisis en tiempos de guerra.

Métodos: Se aplicaron: Cuestionario emocional, Cuestionario de resiliencia psicológica de los militares de las Fuerzas Armadas de Ucrania en condiciones de hostilidades, Escala de calificación de reajuste social, Prueba de propensión al riesgo de Schubert. Para el procesamiento estadístico se utilizó análisis descriptivo y análisis de regresión.

Resultados: Se encontró que la inteligencia emocional determina la estabilidad psicológica ($R^2= 0,746$, $\beta= 1,36$), la resistencia al estrés ($R^2= 0,721$; $\beta= 3,80$), la disposición al riesgo ($R^2= 0,746$; $\beta= 2,29$), es decir, contribuye a la gestión de crisis eficaz.

Conclusiones: La inteligencia emocional es un requisito previo para el desarrollo de la estabilidad psicológica, la resistencia al estrés y la preparación para el riesgo, que garantizan la eficacia de la toma de decisiones de liderazgo en tiempos de guerra. Los líderes con alta inteligencia emocional son capaces de actuar de forma más eficaz en situaciones de crisis.



Palabras clave: bienestar psicológico; gestión de recursos de personal en salud; inteligencia emocional; regulación emocional; resiliencia psicológica; asunción de riesgos.

Received: 26/02/2024

Approved: 06/05/2024

INTRODUCTION

Wartime in Ukraine and the use of a strategic defence resource require the Armed Forces of Ukraine to have competent specialists with leadership qualities who are able to effectively perform management tasks for the protection of the state. Therefore, the main mission of every serviceman is to demonstrate leadership in a combat environment. For this purpose, every serviceman must develop his/her character and professionalism, achieving excellence and productivity in wartime. Military leadership is a key success factor and the ability to motivate subordinates to achieve significant results in war.⁽¹⁾

Crisis management in wartime requires military leaders to be highly resilient to stress, to have psychological resilience, the ability to control themselves and others, and make quick and effective decisions. Currently, military leaders face emergency crisis situations to a greater extent than political leaders, that require physical and mental preparation.⁽²⁾ They deal with new cultural, intellectual, and practical challenges that have not existed before, requiring them to have high emotional intelligence.⁽³⁾

Developed emotional intelligence (EI) in military leaders is the key to effective and successful decisions.⁽⁴⁾ The emotional intelligence skills are especially important in crisis management. They contribute to understand and fulfill a number of strategic and tactical tasks, improving the relationship management system, optimizing the forms and methods of interaction with the team.⁽⁵⁾

Achieving balance in interpersonal relationships with subordinates and the effectiveness of professional activity in wartime depends mainly on emotional intelligence.⁽⁶⁾ The researchers prove the influence of EI on management in the military sphere and claim that developed EI in military leaders is a necessary



condition for successful management decisions.⁽⁷⁾ A leader who shows a high Index of Emotional Intelligence (IEI) can activate his personal potential and the potential of subordinates.⁽⁸⁾

Emotionally intelligent leaders are able to control their behaviour and improve the performance of subordinates.⁽⁴⁾ The higher the resilience of military leaders, the higher their endurance and effectiveness in fulfilling combat missions.⁽⁹⁾ Psychological resilience and stress resistance enable productive management of crisis situations.⁽¹⁰⁾

Developed emotional intelligence allows to effectively build relationships, maintain emotional connections, control emotional state, constructively express emotions, etc. All this forms an individual's psychological resistance to the negative effects of the surrounding environment. Emotional intelligence describes the ability to understand emotions and respond accordingly to one's own and other people's emotional states. It is a necessary quality for people who work in teams, in particular for leaders.⁽¹¹⁾

Emotional intelligence is a set of social abilities and qualities necessary for the functioning of each person in society⁽¹²⁾ in social interactions, and during communication with others.⁽¹³⁾

The main general features of the professional activity of servicemen are the legislative regulation of military activity; psycho-emotional tension; the collective structural nature of work;⁽¹⁴⁾ a set of physical and mental requirements for a military leader's personality.⁽¹⁵⁾ An important component of the military profession is managerial activity. The managerial activity of a military leader is characterized by the regulation of technological, social, individual psychological and other processes occurring in the unit.⁽¹⁶⁾ This proves the importance of their emotional awareness, resistance to negative influences, readiness to take risks at the right moment.

By using emotion recognition and regulation strategies, military leaders are able to replace ineffective decision making with productive responses to crisis situations.⁽¹⁷⁾ This means that the emotional intelligence makes it possible not only to control one's own and other people's emotions, but also to adjust strategies of behaviour and management.⁽¹⁸⁾

In wartime, the ability to manage emotions and recognize them provides greater endurance and resilience in critical situations.⁽¹⁹⁾ And the more often a military leader applies emotional intelligence, the stronger his stress resistance is.⁽²⁰⁾ Therefore, understanding the connection between emotional intelligence and resistance to stress experienced by a serviceman is of great importance for crisis management.⁽¹⁶⁾ A



military leader's resilience to stress can influence the servicemen's ability to demonstrate positive adaptation to crisis situations.⁽²¹⁾ This means that the leader's stress resistance forms the stress resistance of subordinates.

Psychological resilience enables effective action in crisis situations, maintaining calmness and clarity of mind for making management decisions.⁽²⁰⁾ Emotionally stable military leaders have an advantage in professional selection for leadership positions. They are able to withstand the intense conditions of war, so they are effective leaders. With low psychological resilience, the level of perceived stress has a determining effect on productivity and reduces it.⁽¹⁰⁾

So, a theoretical review of studies showed that emotional intelligence in military leaders is a broad concept that primarily includes psychological resilience, stress resistance, and risk-taking in crisis situations. This conclusion needs empirical verification.

It is almost impossible to conduct research involving high-ranking military leaders in wartime conditions, so the impact of emotional intelligence on crisis management in reserve officers was investigated. These are military men who have ranks and are leaders. They are required to assume duty at any time and must be ready to effectively lead the unit.

Hypothesis: emotional intelligence of military leaders affects crisis management through the formation of stress resistance, psychological resilience, and risk-taking.

The purpose of the study is to study how the emotional intelligence of military leaders ensures effective management of crisis situations during war by identifying the level of emotional intelligence in military leaders; psychological resilience of military leaders; stress resistance and risk-taking of military leaders.

METHODS

Design

A cross-sectional descriptive study was conducted, which lasted 4 months during August-November 2023, in four stages. The first stage involved a methodological review of diagnostic tests. The second stage provided for preparing diagnostic forms and conducting the research. The third stage provided for



data processing and interpretation of the results, and their correlation with other studies. The fourth stage involved drawing conclusions and outlining research prospects.

Subjects

The study included 206 (175 male and 31 female) military officers aged 21 to 25 years who underwent military training at the Center for the Training of Reserve Officers and Military Accounting of the Interregional Academy of Personnel Management in charge of the training of military leaders capable of acting in the national and international environment. The average age of the subjects was 23.8 ± 3.4 . Of these, 64 are contract officers who participated in military operations and commanded units. The criteria for inclusion were a confirmed graduation from a military department and the presence of an officer rank. The exclusion criterion was incomplete military training.

Variables

The variables in the study were: emotional intelligence, psychological resilience, stress resistance (psychological well-being) and risk-taking.

Procedures

Hall's Test of Emotional Intelligence (EQ Test).⁽²²⁾ This test is the most widely used EI diagnostic tool in the world. The test includes the scales: self-awareness, self-regulation, social skills, empathy, and motivation.

Questionnaire of Psychological resilience of Servicemen of the Armed Forces of Ukraine in the Conditions of Hostilities.⁽⁹⁾ The questionnaire determines the level of the components of the psychological resilience of servicemen. The test has 6 components of psychological resilience: moral, motivational, cognitive, emotional, volitional, and personal.

The Social Readjustment Rating Scale (SRRS);⁽²³⁾ better known as the Holmes-Rahe Stress Inventory. The test detects the level of stress resistance of the subjects. High scores on the test indicate low stress tolerance, while low scores indicate high stress tolerance.

Schubert Risk Propensity Test (SACS).⁽²⁴⁾ The test shows risk-taking and how appropriate the risk is. The overall test score is given on a continuous scale as deviation from the mean.



Processing

Descriptive statistics were used to present the average values of test results. Minimum and maximum value, mean value and standard deviation were calculated for each variable. Regression analysis was used to study how emotional intelligence affects the management of crisis situations. All calculations were made in Microsoft Excel and SPSS 22.0 programs.

Bioethical issues

The research was conducted in compliance with the principles of the Declaration of Helsinki. All subjects gave their voluntary informed consent for diagnostics before the study. The respondents were informed of the purpose and objectives of the research. Data privacy and non-disclosure were guaranteed.

RESULTS

According to N. Hall’s EQ Test, data were obtained that testify to the dominance of a high level of emotional intelligence of military leaders (sample) (table 1).

Table 1 – Indicators of emotional intelligence of sample (n= 206)

Parameters of emotional intelligence	Min	Max	Mean	Standard Deviation
Self-awareness	2.00	17.00	15.94	3.30
Self-regulation	4.00	17.00	16.40	4.11
Motivation	3.00	18.00	14.88	4.51
Empathy	2.00	18.00	16.21	4.55
Social skills	2.00	18.00	15.83	4.69
Emotional Intelligence	15.00	74.00	71.26	16.79

Military leaders have high indicators of self-awareness, social skills, motivation, empathy, and self-regulation; the general level of emotional intelligence. Such results indicate significant emotional awareness and resilience. The use of the Questionnaire of Psychological resilience of Servicemen of the



Armed Forces of Ukraine in the Conditions of Hostilities⁽¹²⁾ showed mostly high psychological resilience (table 2).

Table 2 – Indicators of psychological resilience of sample (n= 206)

Components of psychological resilience	Min	Max	Mean	Standard Deviation
Moral	0.970	3.950	3.441	0.992
Motivational	1.130	3.650	3.686	0.896
Cognitive	0.780	3.860	2.569	1.073
Emotional	0.140	3.920	3.419	1.263
Volitional	0.730	3.810	3.204	1.149
Personal	0.650	3.560	2.219	0.971
Integral indicator (II)	0.940	3.740	3.423	1.012

Military have a high level of moral and psychological component of psychological resilience, motivational component, emotional, volitional, and integral indicator of psychological resilience. The medium severity of the cognitive and evaluative, as well as individual and personal components is presented. The obtained results testify to the high stability of the subjects, their motivational willingness to maintain stability in difficult situations.

According to the Holmes-Rahe Stress Inventory and Schubert Risk Propensity Test, a high level of stress resistance and risk-taking of military leaders was established (table 3).

Table 3 – Indicators of stress resistance and risk-taking (n= 206)

Components	Min	Max	Mean	Standard Deviation
Stress resistance	67.00	376.00	133.69	89.33
Risk-taking	-38.00	38.00	23.08	25.51

The results show that sample has a high level of stress resistance and risk-taking. The obtained data suggest that military leaders have the ability to make productive decisions in stressful situations and work as part of a team at the same time.

Regression analysis revealed the degree of influence of the general level of EI on crisis management in wartime (table 4).



Table 4 – Regression analysis of the influence of emotional intelligence on crisis management in wartime

Indicators of emotional intelligence	β	SD	R	R ²	F	P
Psychological resilience						
Self-awareness	0.10	0.19	0.883	0.781	142.28	0.000
Self-regulation	1.14	0.16				
Motivation	0.25	0.15				
Empathy	0.31	0.16				
Social skills	0.37	0.10				
Emotional Intelligence	1.36	0.19				
Stress resistance						
Self-awareness	2.17	1.88	0.849	0.721	102.81	0.000
Self-regulation	2.29	1.62				
Motivation	0.81	1.53				
Empathy	1.98	1.61				
Social skills	1.34	0.78				
Emotional Intelligence	3.80	0.98				
Risk-taking						
Self-awareness	1.31	0.73	0.691	0.677	36.51	0.000
Self-regulation	0.81	0.63				
Motivation	3.13	0.59				
Empathy	0.88	0.62				
Social skills	0.02	0.38				
Emotional Intelligence	1.32	0.738				

β - standardized coefficient; SD – standard deviation; R - correlation coefficient; R² - coefficient of determination; F – Fisher's F test; P – significance.

It was found that emotional intelligence on 75% explains the psychological resilience (R²= 0.746, β = 1.36), stress resistance by 72% (R²= 0.721, β = 3.80) and explains readiness to risk by 68% (R²= 0.677, β = 1.32).



DISCUSSION

The study showed that military leaders have high EI, which promotes their development psychological resilience, stress resistance, and risk-taking. The developed emotional intelligence of military leaders characterizes their ability to understand emotions, control them and perceive other people's emotions, which generally ensures effective managerial activity. The ability to emotionally control one's mental state, to perceive the emotional states of subordinates enable the leader to instantly resolve conflict situations. At the same time, emotional intelligence contributes to psychological stability, stress resistance, and risk readiness. Such characteristics ensure effective crisis management. It was proved that EI has a significant explanation on the mentioned parameters and determines the degree of successful crisis management in wartime.

Similar results were obtained in other studies. Developed EI and stress resistance allowed military leaders to overcome crisis situations during combat operations.⁽²¹⁾ Leaders with high emotional intelligence more effectively use emotional awareness skills in, decision-making and crisis management,⁽¹⁹⁾ have good self-regulation,⁽¹⁾ and positively influence the development of interpersonal relationships.⁽¹⁴⁾ There are differences in leadership behaviour and manifestations of emotional intelligence of leaders of the highest and middle military rank.⁽²⁵⁾

Many researchers claim that it is extremely important to monitor the latest technologies⁽²⁶⁾ for increasing EI in military leaders⁽²⁷⁾ which will positively affect professional activity.⁽⁸⁾

Authors⁽⁹⁾ found that emotional intelligence plays a significant role in officer leadership. The higher the emotional intelligence of leaders, the higher it is among subordinates. Such data indicate the importance of the influence of emotional intelligence on management.

Current results are consistent with the other result,⁽¹²⁾ which showed that the higher the level of emotional intelligence of servicemen, the higher their psychological stability and hardiness.

The research limitations include the difficulty of diagnosing a large number of military leaders, in particular because of the military operations in the country. The diagnostics of those military leaders who are direct combatants is also a problematic issue in order to identify differences between their EI and the EI of non-combat leaders.



The prospects of research are to identify emotional intelligence and its impact on crisis management in leaders of different ranks, as well as determining the optimal ways of developing emotional intelligence and the related qualities of military leaders. It is also appropriate to study the relationship between the level of emotional intelligence of military leaders and the psycho-emotional state of their subordinates. The study found that the emotional intelligence of military leaders allows effective management of crisis situations during a war at the expense of psychological resilience, stress resistance, and risk-taking. It allows them to control their emotions, express them, perceive the emotional states of subordinates. Therefore, the developed emotional intelligence is a necessary condition for successful crisis management, which is quite valuable in wartime. Such data can be used in the professional training of military leaders for crisis situations. This will make it possible to improve the success of decision-making, increase the effectiveness of military operations, and ensure the stability and trust of personnel.

BIBLIOGRAPHIC REFERENCES

1. Semenenko O, Semenenko L, Dobrovolskyi Y, Vodchyts O, Yarmolchuk M, Piekhota S. The main theoretical and practical aspects of leadership development in the training system of the Armed Forces of Ukraine: Foreign and domestic experience [Internet]. *J Sci Papers Soc Dev Secur.* 2023; 13(4):224-39. DOI: 10.33445/sds.2023.13.4.16
2. Zhylin M, Makarenko S, Kolohryvova N, Bursa A, Tsekhmister Y. Risk factors for depressive disorders after coming through COVID-19 and emotional intelligence of the individual [Internet]. *J Intellect Disabil Diagn Treat.* 2022; 10(5):248–58. DOI: 10.6000/2292-2598.2022.10.05
3. Aguilar S, George B. A review of the linkages between emotional intelligence and leadership in the military forces [Internet]. *Business Ethics Leadersh.* 2019; 3(2):29-38. DOI: 10.21272/bel.3(2).29-38.2019
4. Coronado-Maldonado I, Benítez-Márquez MD. Emotional intelligence, leadership, and work teams: A hybrid literature review [Internet]. *Heliyon.* 2023; 9(10):e20356. DOI: 10.1016/j.heliyon.2023.e20356



5. Lahodzinskyi VV, Shevchuk OV. Application of emotional intelligence skills by a military leader in adjusting internal communications [Internet]. *Habitus*. 2022; 41:255-261. DOI: 10.32782/2663-5208
6. Pasko K, Motruk T. The features of mobilized military personnel's stress resistance [Internet]. *Psychol J*. 2019; 5(12):72–85. DOI: 10.31108/1.2019.5.12.5
7. Garcia Zea D, Sankar S, Isna N. The impact of emotional intelligence in the military workplace [Internet]. *Hum Resour Dev Int*. 2020; 26:1-17. DOI: 10.1080/13678868.2019.1708157
8. Drigas A, Papoutsis C, Skianis C. Being an emotionally intelligent leader through the nine-layer model of emotional intelligence — The supporting role of new technologies [Internet]. *Sustain*. 2023; 15(10):8103. DOI: 10.3390/su15108103
9. Kokun O, Pischko I, Lozinska N. Differences in military personnel's hardiness depending on their leadership levels and combat experience: An exploratory pilot study [Internet]. *Mil Psychol*. 2023; 35(6):603-10. DOI: 10.1080/08995605.2022.2147360
10. Bekesiene S, Smaliukienė R, Kanapeckaitė R. The relationship between psychological hardiness and military performance by reservists: A moderation effect of perceived stress and resilience [Internet]. *Healthc*. 2023; 11(9):1224. DOI: 10.3390/healthcare11091224
11. MacEwan D, Gibson A. Emotional intelligence in military medical officers in the Defence Medical Services [Internet]. *BMJ Mil Health*. 2023; 169(6):554–8. DOI: 10.1136/bmjmilitary-2021-002068
12. Lebeck BW, Chighizola NR. Emotional intelligence and its effect on performance outcomes in a leadership development school [Internet]. *J Values-Based Leaders*. 2018; 11(2):15. DOI: 10.22543/0733.62.1223
13. Kozáková E, Saliger R. The role of emotional intelligence in direct leadership in the army of the Czech Republic [Internet]. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*. 2019; 67:265-73. DOI: 10.11118/actaun201967010265.
14. Krymets L. Leadership as a special form of power in the modern military professional environment [Internet]. *Bulletin of National Defense University of Ukraine*. 2019; 50(2):51–8. DOI: 10.33099/2617-6858-2018-50-2-51-58



15. Díez F, Martínez-Moran P, Aurrekoetxea-Casaus M. The learning process to become a military leader: Born, background and lifelong learning [Internet]. *Front Educ.* 2023; 8. DOI: 10.3389/feduc.2023.1140905
16. Flood A, Keegan RJ. Cognitive resilience to psychological stress in military personnel [Internet]. *Front Psychol.* 2022; 13:809003. DOI: 10.3389/fpsyg.2022.809003
17. Oden KB, Lohani M, McCoy M, Crutchfield J, Rivers S. Embedding emotional intelligence into military training contexts [Internet]. *Procedia Manuf.* 2015; 3:4052-4059. DOI: 10.1016/j.promfg.2015.07.976
18. Crosby RS. Effect of emotional experiences on emotional intelligence among U.S. military leaders [Internet]. [Ph.D. Theses]. Minneapolis, MN: Walden University; 2017. [access: 01/12/2023]. Available from: <https://scholarworks.waldenu.edu/dissertations/2965>
19. Jeppesen D. Emotional intelligence and military advisors [Internet]. *J Sci Med Sport.* 2017; 20(suppl 2):S71. DOI: 10.1016/j.jsams.2017.09.605
20. Nakkas C, Annen H, Brand S. Psychological distress and coping in military cadre candidates [Internet]. *Neuropsychiatr Dis Treat.* 2016; 12:2237–2243. DOI: 10.2147/NDT.S113220
21. Coughlin E. Fostering resilience: leader strategies and practices for overcoming adversity in military organizations [Internet]. [Doctoral Theses]. Malibu, CA: Graduate School of Education and Psychology; 2018 [access: 01/12/2023]. Available from: <https://digitalcommons.pepperdine.edu/etd/913/>
22. Schutte NS, Malouff JM, Hall LE, Haggerty DJ, Cooper JT, Golden CJ, Dornheim L. Development and validation of a measure of emotional intelligence [Internet]. *Pers Individ Dif.* 1998; 25(2):167-177. DOI: 10.1016/S0191-8869(98)00001-4
23. Holmes TH, Rahe RH. The Social Readjustment Rating Scale [Internet]. *J Psychosom Res.* 1967; 11:213–218. DOI: 10.1016/0022-3999(67)90010-4
24. Schubert R, Brown M, Gysler M, Brachinger HW. Financial Decision-Making: Are Women Really More Risk-Averse? [Internet]. *The American Economic Review.* 1999; 89(2):381–5. Available from: <http://www.jstor.org/stable/117140>



25. Kovtunyk I, Ishchenko Y, Yuvsechko Y, Tychyna V, Datso T. Social changes that occurred on the European continent due to the War in Ukraine, Lessons Learned or History Repeating? [Internet]. *Rev Cercet Interv Soc*. 2023; 82:38-49. DOI: 10.33788/rcis.82.3
26. Durham MRP, Smith R, Cloonan S, Hildebrand LL, Woods-Lubert R, Skalamera J, et al. Development and validation of an online emotional intelligence training program [Internet]. *Front Psychol*. 2023; 14:1221817. DOI: 10.3389/fpsyg.2023.1221817
27. Zhylin M, Mendelo V, Makarenko S, Samara O, Ishchenko Y. Peculiarities of the impact of psychotropic substances on the development of emotional intelligence of drug addicts [Internet]. *Univers J Public Health*. 2023; 11(5):593-602. DOI: 10.13189/ujph.2023.110507

Conflict of interest

The authors have no conflicts of interest to disclose.

Author contributions

Conceptualization: *Yevhenii Ishchenko, Yevhen Potapchuk*.

Data curation: *Iryna Yevchenko, Andrii Masliuk*.

Formal Analysis: *Iryna Yevchenko*.

Research: *Andrii Masliuk, Serhii Myronets*.

Methodology: *Iryna Yevchenko*.

Project Administration: *Yevhenii Ishchenko*.

Resources: *Serhii Myronets*.

Supervision: *Andrii Masliuk*.

Validation: *Andrii Masliuk*.

Visualization: *Serhii Myronets*.

Writing - original draft: *Yevhen Potapchuk*.

Writing - Review & editing: *Yevhen Potapchuk, Yevhenii Ishchenko, Iryna Yevchenko*.



Data Availability

The data can be made available upon written request to the authors of the article.