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# A set of professional working ability indicators of military operators

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**Purpose:** *determination of indicators of professional work capacity and their impact on the success of professional activity of military operators in the cycle of alert duty.*

***Material & Methods:*** *indicators of the professional capacity of military operators were determined through theoretical analysis, systematization and generalization of data from scientific and methodological sources, medical-biological, psycho-diagnostic methods and mathematical methods of processing the results of the study.*

***Result:*** *it is determined that the most informative indirect indicators of the professional capacity of military operators of the contract service of the Air Forces of the Armed Forces of Ukraine is: physical condition, psycho-emotional state, physical performance, aerobic endurance, static endurance of back muscles, neck and the abs, the speed of perception, memory, concentration and shifting attention. The correlation dependence of the level of professional preparedness of military operators on indirect indices of professional work capacity: physical fitness (r=0,58), psycho-emotional state (r=0,51), physical performance (r=0,34), aerobic endurance (r=0.59), static endurance of the muscles of the back and neck (r=0,52), static endurance of the abs muscles (r=0,48), simple sensorimotor reaction (r=0,44), short-term (operational) memory (r=0,40), concentration and attention switching (r=0,46).*

***Conclusion:*** *a complex characteristic of the indicators of psycho-physiological functions of the body of a specialist can be used to assess the dynamics and prediction of the professional capacity of military operators of the Air Force in the cycle of alert duty.*

**Keywords:** *military operator, indicators of professional ability to work, professional preparedness.*

## Introduction

Researchers of operators work (L. D. Veiner-Dubrovin, 1980, Yu K. Demyanenko, 1987, M. S. Korolchuk, 1997; Y. A. Borodin and others, 2008) indicate that military-operators perform the tasks of alert duty under the influence of negative factors of military professional activity [4]. During a 24-hour watch in the conditions of grounded command posts, there is a significant deterioration in the state of health against the background of fatigue, which leads to a decrease in the efficiency and reliability of performing professional tasks during combat alert duty [1; 3; 11].

According to M. S. Korolchuk, the efficiency and reliability of the activity of the specialists in the operator's field are closely related to the notion of professional work capacity [11]. It remains an open question of maintaining high professional capacity for work and ensuring the success of professional activities of Air Force servicemen in the cycle of alert duty, which confirms the relevance of the study that is carried out.

**Relationship of research with scientific programs, plans, themes**. The research is carried out in accordance with the plan of research works of the Air Force of the Armed Forces of Ukraine and is a composite research work "Theoretical and methodological foundations of the physical training system for servicemen of the Air Force of Ukraine", the cipher "Guidance-PI" with the state registration number 0101U001112.

**Purpose of the study:** determination of indicators of professional work capacity and their impact on the success of professional activity of military operators in the cycle of alert duty.

## Material and Methods of the research

Study involved 86 military-operators, aged from 20 to 35 years, who were divided into two groups according to the level of professional preparedness. Study was conducted for eight months on the basis of the command post of the regiment A1451. General scientific methods (theoretical analysis, systematization and generalization of data) were used to study and analyze information from scientific and methodological sources on the issues of physical education, psychophysiology of labor and the specifics of the military professional activity of the specialists in the operator's profile. Problem of maintenance and preservation of working capacity is considered the main one in the physiology of labor. Efficiency of any work activity is provided on the basis of taking into account physiological and psychological patterns of human factor functioning. According to Y. V. Krushelnytska, human performance is the physiological basis of labor productivity. It determines professional performance as the maximum efficiency of human activity at a level of functional mobilization that does not cause a state of overstrains of the body of a specialist [6].

According to the researchers of the physiology of labor (M. S. Korolchuk, D. A. Oshanin, I. A. Sapov, A. S. Solodkov), work capacity is estimated by direct and indirect indicators. Direct indicators are: quality, reliability and the amount of labor, and the secondary indicators of the body's functions, that is, the psycho-physiological cost of effective and reliable activity [3; 8; 10]. These statements are acceptable and for the

military operators of the Air Force of Ukraine.

According to A. A. Navakaktiyan, V. V. Kryzhanovskiy, V. V. Kalnish, M. S. Korolchuk, under real alternation conditions, it is difficult to assess the performance with the use of criteria for the performance of professional duties by the operator [6]. Moreover, not always direct indicators (quality, reliability and quantity of labor) correspond to the real psycho-physiological price of labor [3; 10]. With this in mind, scientists (I. A. Sapov, V. S. Shchegolev, 1979; L. S. Solodkov, 1980; V. I. Osodlo 2001, V. M. Krasota 2007) it is offered to compare and predict changes in the level of professional work capacity with the help of a complex characteristic of psycho-physiological functions of the specialist body. General characteristics of psychophysiological functions in the process of military professional activity can be realized with the help of an integral evaluation of indirect indicators of the professional capacity of specialists of the operator profile [3; 5].

Solving the problem of assessing the success of carrier activity in the conditions of alert duty requires the consideration of a large number of direct and indirect indicators [3; 10]. Based on the analysis of scientific and methodological sources and the research conducted by us, it is determined that informative indirect indices of the professional capacity of servicemen-operators of the contract service of the Air Forces in the conditions of combat duty is: physical state, psycho-emotional state, physical working capacity, aerobic endurance, static endurance of back muscles, neck and abdominal muscles, information perception speed, memory, concentration and attention switching. With their help of a complex characteristic, it is possible to objectively predict the dynamics of the professional capacity of military servicemen at a particular stage of fulfilling their official duties [10].

Pedagogical methods, namely pedagogical observation, pedagogical testing, pedagogical experiment were used to determine the influence of the indicators of psycho-physiological functions on the success of military professional activities of military servicemen in the cycle of alert duty.

In order to study the issue of the connection between the levels of professional preparedness of military operators under the contract of the Air Force of Ukraine with informative indirect indicators of professional capacity for work, we conducted a study of the indices of representatives of two groups with different average assessment of professional preparedness.

Determination of the professional preparedness of the military-operators was carried out by studying and analyzing the assessments received for each alert on a four-point scale and assessments for the implementation of special training standards, with subsequent distribution of servicemen into two groups, according to their level of preparedness.

Physical condition of servicemen-operators was estimated by the method of A. A. Pirogova (physical state index).

Psycho-emotional state of servicemen-operators was determined by the HAM method (health, activity and mood) by questioning.

To assess the physical performance of military-operators, a simplified version of the classical step-test of Harvard University was used in the interpretation of the American test system YMCA (J. R. Morrow, 2000).

Aerobic endurance of military-operators was investigated for performing the exercise of running 3000 meters.

In order to assess the special physical qualities of military operators, on the basis of preliminary studies identified indicators:

Static strength endurance of the muscles of the back and neck – exercise the maintenance of the torso in a horizontal position [11];

static endurance of the abdominal muscles – an exercise angle in the abutment on the uneven bars [11].

Psychodiagnostic methods were used in our studies to assess the quality of mental work (memory, attention, sensorimotorics) as indirect indicators of the professional capacity of specialists in the operator's profile [3]. Study of the speed of information perception was carried out due to the definition of the latent period of a simple sensorimotor reaction. Coefficient of success of concentration and switching of attention was determined with the help of Krapevelin tables [3]. To assess the success of short-term memory, standard techniques for the study of auditory memory by numbers [2].

Methods of mathematical statistics (methods of mathematical processing of the results obtained) were used to characterize the groups studied and to reveal the difference in the values between the groups.

## Results of the research and their discussion

The results of the study of informative indirect indicators of the professional capacity for work of two groups of servicemen with different levels of professional preparedness are presented in Table 1.

Analyzing the indirect indicators of the professional capacity for work of representatives of two groups with different levels of professional preparedness, we note the presence of reliably worse results among servicemen with "satisfactory" assessment of professional preparedness compared with representatives of the group on a "good" assessment (Table 1):

– Physical state index – on 4,7% at t=2,60;
– Evaluation of psycho-emotional state – on 8,5% at t =5,66;
– Physical performance – on 5,5% at t=2,76;
– Aerobic endurance – on 2,7% at t=2,97;
– Static strength endurance of the back and neck muscles – on 6,1% at t=2,09;
– Static endurance of the abdominal muscles – on 9,5% at t=2,28;
– Response time to external signal – on 4,8% at t=2,24;
– Coefficient of success of short-term memory – on 7,9% at t=2,86;
– Coefficient of attention success rate – on 10,2% at t=2,86.

For the purpose of confirming or refuting the experimental data on the dependence of the level of professional preparedness of military operators on the contract of the Air Forces of Ukraine on these indirect indicators of professional capacity for work we performed a correlation analysis of the results of combat duty and the results of determining the physical

**Table 1**

**Indicators of professional capacity for military servicemen with different levels of professional preparedness**

| Indicators of professional capacity | Assessment of professional preparedness | $\bar{X}\pm m$ | Significance level |
|---|---|---|---|
| Physical state index (c.u.) | Good (n=42)<br>Satisfactory (n=44) | 0,675±0,007<br>0,645±0,008 | p<0,05 |
| Psycho-emotional state (points) | Good (n=42)<br>Satisfactory (n=44) | 7,01±0,06<br>6,46±0,08 | p<0,001 |
| Physical performance (beat.·min$^{-1}$) | Good (n=42)<br>Satisfactory (n=44) | 100,7±1,1<br>105,6±1,4 | p<0,05 |
| Aerobic endurance (s) | Good (n=42)<br>Satisfactory (n=44) | 825,36±4,51<br>848,43±6,36 | p<0,05 |
| Static strength endurance of the back and neck muscles (s) | Good (n=42)<br>Satisfactory (n=44) | 96,10±2,13<br>90,55±1,60 | p<0,05 |
| Static endurance of the abdominal muscles (s) | Good (n=42)<br>Satisfactory (n=44) | 47,17±1,36<br>43,07±1,18 | p<0,05 |
| Response time to external signal (ms) | Good (n=42)<br>Satisfactory (n=44) | 329,22±4,95<br>345,86±5,54 | p<0,05 |
| Coefficient of success of short-term memory (%) | Good (n=42)<br>Satisfactory (n=44) | 70,52±1,26<br>65,36±1,30 | p<0,05 |
| Coefficient of attention success rate (%) | Good (n=42)<br>Satisfactory (n=44) | 87,21±1,86<br>79,16±2,11 | p<0,05 |

state index, evaluation the psycho-emotional state, assessing physical performance, aerobic endurance, static endurance of the back, neck and abdominal muscles, reaction time to the external signal, success rate of short-term memory and the success rate of attention in 86 military-operators (Table 2).

Obtained results of determining the correlation of the level of professional preparedness of military operators under the contract with indirect informative indicators of professional capacity for work demonstrated the presence (see Table 2):

– average correlation of the assessment of professional preparedness with the physical state index, the evaluation of the psycho-emotional state, static endurance of the back, neck and abdominal muscles, success rates of short-term memory and attention;

– weak correlation of the assessment of professional preparedness with physical capacity.

It should also be noted that there is a feedback of the assessment of professional preparedness with the time of the exercise of the control exercise for aerobic endurance and the response time to an external signal (see Table 2).

## Conclusions

According to the results of the study, it is determined that the most informative indirect indices of the professional capacity of military operators of the Air Force of Ukraine are: physical condition, psycho-emotional state, physical working capacity, aerobic endurance, static endurance of the back, neck and abdominal muscles, speed of information perception, memory, concentration and attention switching.

Correlation dependence of the level of professional preparedness of military operators from indirect indices of professional work capacity: physical condition (r=0,58), psycho-emotional state (r=0,51), physical working capacity (r=0,34), aerobic endurance (r=0,59), static endurance of the back, neck muscles (r=0,52 static endurance of the abdominal muscles (r=0,48), simple sensorimotor reaction (r=0,44), short-term (operational) memory (r=0,40), concentration and attention switching (r=0,46).

This fact testifies to the possibility of applying a complex characteristic of the indicators of the physiological functions of the body of a specialist for assessing the dynamics and predicting the professional capacity of military operators of the Air Force in the cycle of alert duty.

**Table 2**

**Correlation between the indicators of professional preparedness and indicators of the professional capacity of military-operators (n=86)**

| Indicators of professional capacity | Correlation relationship, r |
|---|---|
| Physical state index (c.u.) | 0,58 |
| Psycho-emotional state (points) | 0,51 |
| Physical performance (beat.·min$^{-1}$) | 0,34 |
| Aerobic endurance (s) | –0,59 |
| Static strength endurance of the back and neck muscles (s) | 0,52 |
| Static endurance of the abdominal muscles (s) | 0,48 |
| Response time to external signal (ms) | –0,44 |
| Coefficient of success of short-term memory (%) | 0,40 |
| Coefficient of attention success rate (%) | 0,46 |

In the **future**, we are aim research to use the integral assessment of professional work capacity to determine the effectiveness of the special physical training program for military operators of the Air Force of Ukraine in the cycle of alert duty.

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