

HEALTH PROMOTION IN AVIATION*

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Annotation. Health promotion aims mainly at improving biological fitness of the human being. Achievement of the full life opportunities and satisfaction is a final, most important goal of the health promotion. Especially important is the promotion of the healthy individuals working in extraterrestrial environment. Collected data have shown that the most common illnesses and causes of disability to work of the military flying personnel included 3 groups of the diseases (about 70% of cases): cardiovascular diseases – about 35%; neuroses and psychological disorders – about 20%, and spinal diseases – about 15% of cases. Therefore, programs of health maintaining in the flying personnel are so important. Proposal of health protection of the aircrew and prophylactic actions are also addressing in this article.

Key words: health promotion, fighting pilot, healthy behaviors.

Анотація. Ясинські Тадеуш. Пропаганда здоров'я в середовищі пілотів. Головною метою пропаганди здоров'я є удосконалення людини у його біологічній здатності. Досягнення людей розширює їх життєві можливості, а задоволення життям є фінальною, важливішою метою пропаганди здоров'я. Особливо важливо під час пропаганди здорової людини, працюючої поза земному середовищу. Отримані дані свідчать, що найбільш часто захворювання і причини нездатності до виконання спеціальності військового льотного персоналу торкається трьох нозологічних груп (біля 70% випадків): хвороби системи кровообігу - 35%; неврози і психічні розлади – 20%; хвороби хребта – 15%. Тому так важливо програмування заходів, які мають за мету утримання високої кондиції здоров'я пілотів. У праці також подані пропозиції до плану забезпечення здоров'я потрібного персоналу льотної одиниці, а також профілактичних заходів.

Ключові слова: пропаганда здоров'я, військовий льотчик, здоровий стиль життя.

Анотация. Ясински Тадеуш. Пропаганда здоровья в летной среде. Ведущей целью пропаганды здоровья является совершенствование человека в его биологической предрасположенности. Достижения людей расширяет их жизненные возможности, а удовлетворение жизнью является финальной, важнейшей целью пропаганды здоровья. Особенно важно при пропаганде здорового человека, работающего во внеземной среде. Полученные данные свидетельствуют, что наиболее часто заболевания и причины неспособности к выполнению специальности военного летного персонала касается трех нозологических групп (около 70% случаев): болезни системы кровообращения - 35%; невроты и психические расстройства – 20%; болезни позвоночника – 15%. Поэтому так важно программирование мероприятий, имеющих целью удержание высокой кондиции здоровья летного персонала. В работе также показаны предложения по плану обеспечения здоровья необходимого летному персоналу летной единицы, а также профилактических мероприятий.

Ключевые слова: пропаганда здоровья, военный летчик, здоровый образ жизни.

Streszczenie: Jasiński Tadeusz. Promocja zdrowia w środowisku lotniczym. Zasadniczym celem promocji zdrowia jest doskonalenie człowieka w jego dyspozycji biologicznej. Osąganie przez ludzi pełni ich życiowych możliwości oraz życiowej satysfakcji jest finalnym, najważniejszym celem promocji zdrowia. Szczególnie ważna jest promocja zdrowego człowieka pracującego w środowisku ponad ziemskim. Zebrane dane wykazały, że najczęstsze schorzenia i przyczyny niezdolności do wykonywania zawodu wojskowego personelu latającego dotyczyły trzech grup schorzeń (ok. 70% przypadków): choroby układu krążenia ok. 35%; nerwice i zaburzenia psychologiczne ok. 20%; choroby kręgosłupa ok. 15%. Stąd tak ważne jest programowanie poczynań mających na celu utrzymywanie wysokiej kondycji zdrowotnej personelu latającego. W pracy ukazano także propozycję planu zabezpieczenia zdrowotnego potrzeb personelu latającego jednostki lotniczej oraz poczynania profilaktyczne.

Słowa kluczowe: promocja zdrowia, pilot wojskowy, zachowania prozdrowotne.

Introduction

Execution of tasks during the flight requires adaptation of psychic and physical activity, established on the earth, to the work in the space. It is important to show everybody, not only physicians, that fighting pilots execute complicated combat missions in the constant time deficit. Therefore, they must concentrate on pilotage, without any burden of health problems, complicated personal situations or problems resulting from the occupational inconveniences. Pilots frequently act in solitude. During flight, the Stationary Command Station (SCS) cannot help an aircrew directly or evacuate disabled pilot from his cockpit. Modern technology enables damaged plane to land, but in several aircrafts such a lucky landing is impossible without the aid of pilot controlling the whole maneuver.

Use of several modern deck devices, protecting the man against harmful work in the air, under changing conditions, did not eliminate such factors as:

- Changing pressure.
- Hypoxia due to the altitude.
- Acceleration.
- Space disorientation.
- Heat shock.

* Large fragments of Adam Skrzypkowski's textbook [ref. 7] were used in this publication with kind consent of the author.

- Vibration.
- Noise.
- Work in time deficit.

Despite a significant progress in the aviation technology and biology as well as several studies on the improving cockpit equipment and pilotage, no full comfort and safety of the work in extraterrestrial space were achieved. It is commonly accepted that pilotage creates certain health and human life hazards, despite the pleasure of flying in the air. One of factors generating various risks is climbing above the biosphere and speed of aircrafts significantly exceeding that of other means of transportation. Acceleration is another such factor.

Prolonged flights associated with rapid move may cause fatigue produced by the immobility, forced sitting position and breathing a dry air under lowered pressure, corresponding to that at 1200 m to 1400 m over sea level and relative humidity about 30%. Low humidity causes dryness of the mucous membranes in the mouth and upper respiratory tract increasing not only the thirst but also creating favorable conditions for bacterial growth in these areas due to decreased salivation (saliva has antiseptic properties).

Change of climatic zones during flights along meridians, i.e. from the north to the south and vice versa, is quite uncomfortable. Change of the climate, e.g. from the summer to winter, requires sudden adaptation of the human body to new temperature, insolation, etc. Parallel flights, i.e. from the east to the west and vice versa, means crossing time zones and jet-lag effect. Natural biological rhythms are deregulated. It means the lack of synchronization between inner biological clock and local (different) solar time. Disordered individual biological rhythm produces symptoms of illness, disturbs functioning of the gastro-intestinal tract, nervous system, and sleep. Adaptation to the new circadian cycle differs in particular individuals. It is assumed that to synchronize the own biological clock with local solar time requires about 90 minutes following the flight to the west and about 60 minutes after the flight to the east. Adaptation period is characterized by a decrease in productivity and intellectual abilities. Sudden change of time zones and circadian rhythm disturbance require appropriate planning of return flight (of the crew) and rapid execution of various activities (including combat missions) by groups of flying people or organization of adaptive rest for them.

The above listed factors, even if they act as single one, may disturb functional equilibrium of the body. Some of them may be compensated, producing a kind of resistance to other factors, but their elimination is impossible. Combined effect of various hazards, which singly may be subliminal, may exceed capability to adapt to the environment. Pilot, working under hard conditions, frequently in solitude or in small group of people, must be sure of his psychophysical efficiency. In the operational limitation of time for decision-making, usually complicated and not always predictable, one cannot think about himself but must concentrate on the combat mission. Complex character of difficulties and efficient execution of tasks requires healthy, intelligent, and educated crew with defined occupational habits, and mentally and physically fit.

Aviation medicine defines the health standards required to work as a pilot. It is studying and evaluating reactions of the normal subject working in aviation environment. General medicine cares of sick man under normal conditions on the earth. Physicians of various specializations (other than aviation) care of the sick pilot who cannot work under such conditions to which the body is not adapted.

Health as defined by the World health Organization (WHO) is: "a state of complete mental, physical, and social well-being and not merely the absence of disease or infirmity". This definition, accepted by the United Nations, seems to be of importance in case of certification allowing the pilot to execute combat mission in the air.

Biomedical care assumes that health is an existentialist state of the bioorganic, emotional, and spiritual harmony. Disease is an abnormal health state produced by internal disorders or invasion or exposure to harmful external factors. Malaise is a subjective feeling of the disease. Functional health means social determination of the capability to carry on interpersonal duties related to the work under normal conditions of human existence. However, health as defined by WHO guarantees the possibility of effective and safe execution of the complicated actions also under difficult (because extraterrestrial) conditions. Therefore, maintenance of the functional health in aircraft crew sufficient to the activity under average working conditions may be a predictor of the air catastrophe.

Health counseling may be realized as:

- (1) General: Addressed to the whole society, providing information about health promoting behaviors and their justification. The way of dissemination of these behaviors is health education which should reach all social groups with adequate knowledge and information level adapted to the foreseen addressee.
- (2) Group: Addressed to the defined group, possibly homogenous in relation to the age, habits, and culture. Such an education aims at turning the attention to both beneficial and harmful effects of various factors typical for this group life style, possible prevention or change.
- (3) Individual: Addressed to particular subject.

Medical certification includes following three stages:

- (1) Preliminary, or selective, certification of candidates to pilotage.
- (2) Periodical: Annual medical examination of the whole population of the military flying personnel.
- (3) Occasional: Specialist medical examination performed on the motion of aerial garrison physician or obligatory, following more serious disease or air accident.

Main task of the constant health care in the aerial garrison and periodical health checks is to reveal the earliest signs of illness, i.e. "pre-pathology". Training in new types of high performance aircraft requires careful assessment of pilots' psychophysical fitness that means carrying out several laboratory tests, specialist training under simulated flying conditions which may be complicated with extreme situations, if necessary.

Central Military Aviation-Medical Commission (CMAMC) performs complex examinations alone or in the laboratories of the Polish Air Force Institute of Aviation Medicine to certify capability of the said individual to execute aviation tasks on the board of certain type of aircraft (propeller-driven airplane, jet aircraft, and helicopter). Certification process and research require integrated data evidence.

Health promotion

Health may be classified to two categories:

- (1) As a biological predisposition to social, economic, and existence activities.
- (2) As a process adapting human being to external environment; including work under various conditions, sometimes loading the body to tolerance limits.

Fundamental task of health promotion is improvement of the human biological disposition. Achievement of full capabilities and satisfaction in life is a final, most important goal of health promotion.

Health promotion in aviation

Programming actions which aim to maintain good health in flying personnel requires knowledge of health hazards resulting from the execution of tasks in the air and actual acquaintance of medical causes of the acquired inability to work as a pilot. Medical factors which may contribute to the air accident include four groups of issues:

- (1) Aircraft: Airframe, power unit, control system, equipment, deck outfit, armament.
- (2) Human factor: Aircraft crew, flight control center.
- (3) Ground protection of aerial actions.
- (4) Air force logistics.

The most frequent diseases and disability to work in aircraft crew (data for 1992 – 1998) included three groups of pathologies (about 70% of cases):

- cardiovascular disorders: about 35% of cases,
- neuroses and psychological disorders: about 20% of cases.
- lesions to the spine: about 15% of cases.

Cardiovascular disorders included most frequently: CAD, arterial hypertension, cardiac arrhythmias, mitral valve insufficiency, and other. These pathologies are probably caused by the presence of risk factors for arteriosclerosis, unhealthy life style, difficult work conditions, and ageing.

Neuroses and psychological disorders most frequently included emotional problems and situational deadadaptation reactions, seemingly related to the actual political and social transformation as well as air force restructuring.

Lesions to the spine are produced by: Unfavorable work place factors (vibration, acceleration, forced body position, changes in work place temperature) and natural ageing of the staff.

Evaluation of the military flying personnel includes the following activities during the whole military service:

- (1) Selection (medical) of candidates to study in the military high schools.
- (2) Periodical and occasional medical examination in CMAMC.
- (3) Epidemiological and prophylactic examinations based on the results of both periodical and occasional health check.
- (4) Tests before take-off and periodical medical examinations in the air force garrisons.
- (5) Sports-recreation periods in the Military Educational-Fitness Centers.

Besides medical knowledge of health hazards and their prevention, one should learn methods of effective actions. In case of flying personnel the following five rules seem valuable:

- Acquaintance with health promotion: individual (pilot) and group (supervisors).
- Necessity of the active cooperation with medical professionals.
- Determination of the personality standard.
- Certain coercion determined by the necessary service and occupational requirements.
- Necessary permanent health promotion.

Knowledge of preventive medicine, both individual and group, results from the analysis of needs and current possibilities to achieve a high occupational efficiency. Such a knowledge and own experience resulting from the knowledge of community (e.g. air force garrison) facilitate the transfer of appropriate recommendations. It is important that such an activity is clear and persuasive. Central idea should be:

- (1) What to do?
- (2) Why?

What to do?

– Includes the following actions:

- General: referring work place.
- Relatively detailed: referring domestic conditions.
- Detailed: basic personal hygienic procedures.

Additionally:

- Education.
- Presentation of the particular exercises (e.g. rules of everyday physical activities).
- Presentations of certain procedures (e.g. teeth brushing).
- Life style accepting learnt or acquired habits.

Achievement of the efficient preventive actions requires actions of health care representatives, understanding of the problem, and the aid of supervisors, ability to influence on the community, and compliance of the protégés. An

important factor is the program adjustment to the possibility of personnel compliance and garrison equipment (gym, fitness club, plying field, etc.). Example of the health protection program in the flying personnel is given in figure 1.

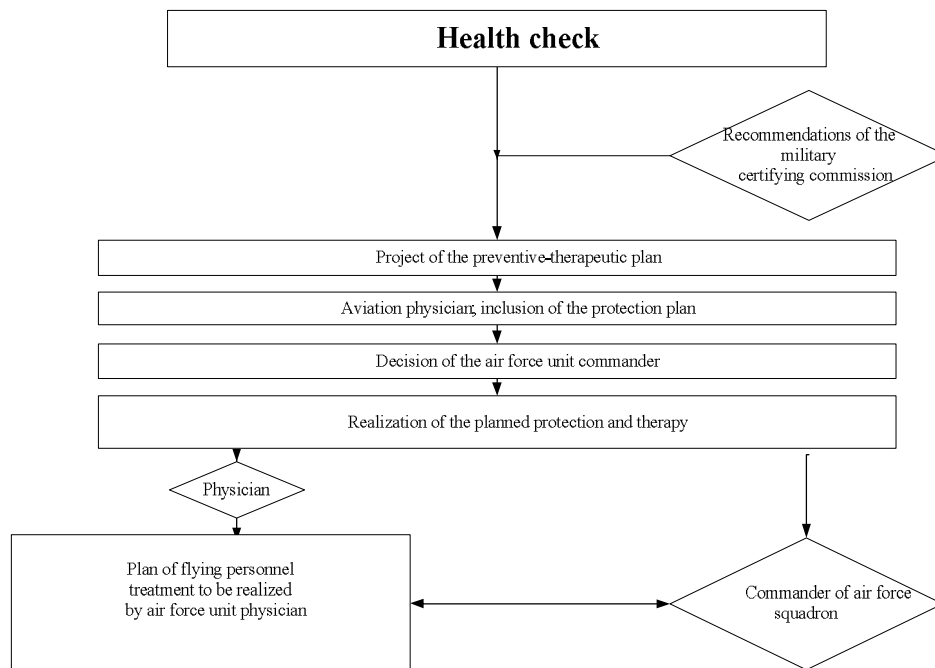


Figure 1. Construction of the health protection of the flying personnel in the air force unit.

The need of the active cooperation with medical professionals embraces both flying personnel and organizational environment: cafeterias, professional education, and aviation instructors which should have basic medical knowledge. This problem seems of special importance as the pilots not always observe balanced diet. Data from the studies in 1996 – 1998 (available in CMAMC data base) suggest hyperlipidaemia in 76% of examined individuals. About 56% of them were overweighted (10% of significant level). Organization and effectiveness of educational program seem to be insufficient as about 50% of examined subjects do not perform endurance exercises, undergo biological regeneration procedures and concentration-relaxation exercises. Aviation instructors should propose and organize healthy leisure time as an addition to and enrichment of the professional education in cooperation with medical profession. Such a need results from pilots' needs as 75% of them consider the forms of occupational rest as ineffective. Aviation instructors should know that endurance exercises under 1000 Kcal daily has no significant effect on the level of oxygen intake. Such a result discourages, because soon it becomes evident that an effort does not produce some effects. Therefore, an effort of organizers and sense of proposed exercises are doubtful. Energy expenditure exceeding 3000 Kcal weekly markedly increases oxygen intake. Endurance exercises of 3,500 Kcal weekly are considered optimum (as stabilizing factor). Only in such a case a desired efficiency at economical effort may be achieved.]

Determination of the personality standard is of basic importance, similarly to a standard in physics, chemistry or metric standards; human being seeking positive definition must have some reference point. From the occupational point of view, "pupil should outdo his master". This principle is obligatory in all organizational levels from the instructor, vee formation commander to the air force group. Aviation physician is also a kind of the standard, who is able to give logic and reliable advice. Formation of the personality standard cannot be a theoretical discussion in both occupational and social groups. Standard, i.e. human being prized by the society (or local community) with an authority should motivate positive actions such as being a leader.

Coercion means only the determination of clear and precise official requirements (including health promotion), determining safety and precise execution of the combat mission. Every soldier, also included into flying personnel, is accounted from such tasks (for good and evil). Of course, it is better if moral (not only formal) urge is present but both forms are overlapping, depending on the needs, understanding and army morale, for safety of single soldier, army, and society.

Organizers of active health promotion should observe certain limits of tolerance. Formation of adaptive mechanisms in the working place in extraterrestrial space should not exceed individual adaptation capabilities. Choice of the individual dose of exercise within 60% to 80% of the actual human efficiency is considered as moderate (safe) load. Such a level of an effort (regular) enables achievement and maintenance of health potential, meant as biological predisposition to execute basic occupational tasks.

A need of the permanent health promotion results from the hazards of tasks executed in the air and significant dissemination of civilization diseases risk factors, including flying personnel. Civilization hazards may lead to an increase in morbidity rate and risk of the increased disability to work in the air.

Maintenance of the good health in flying personnel

Medical procedures in the aviation medicine, different than in other military troupes, are associated with different working environment of flying personnel (besides extraterrestrial). Main activity of the aviation medicine is an achievement and maintenance of good health.

Prophylaxis:

- 1) Constant observation of health and well being of the flying personnel. If necessary, prompt preventive actions such as immediate ban of execution the tasks in air and referral to the Polish Air Force Institute of Aviation Medicine for further follow-up and possible treatment.
- 2) Observation of the aviation hygiene (nutrition, active and passive leisure time, check of the pilot's uniforms, including anti-G suits). Control of the work hygiene: noise, microwaves and other.
- 3) Elaboration and application of preventive ways against foreseen flight sequels.
- 4) Cooperation in the field of physical fitness education.
- 5) Maintenance of the physiological efficiency and tolerance of the harmful factors present during the flight of the said type of aircraft.
- 6) Education of pilots in the field of aviation medicine and hygiene.

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