Chapter 1

THE AEROSPACE MEDICINE PROGRAM

The science of aerospace medicine has fully recognized the almost insurmountable human problems imposed by modern military aircraft. Aerospace medical research scientists of many disciplines are constantly striving to make it possible for man to adapt to the conditions created by the greater speed, higher altitude, extended range, and increased complexity which characterize the aircraft of today and tomorrow. These scientists have had a large measure of success in the research and development of equipment and procedures that enable the military flier to keep pace with aeronautical and operational developments. The ultimate value of future aeromedical research efforts will be only as great as the degree of successful application of the results of these efforts by the individual Flight Surgeon.

The art and practice of aerospace medicine, therefore, must be vigorously pursued by every Flight Surgeon with the full utilization of all available knowledge. The principal objective of this activity is the continued maintenance of the flier in the highest possible state of effectiveness under all circumstances. To insure that this objective is realized, the scope of the Aerospace Medicine Program includes the application of public health and occupational health measures to the entire military community serving the crew member and his mission. The health of the crew member and his effectiveness in meeting mission objectives are intimately correlated with the health and effectiveness of the entire community. AFM 161–2 prescribes the specific principles and procedures for an effective program. The program can be fulfilled by a conscientious application of general and specific knowledge accumulated in the three main functional areas, namely, flight medicine, military public health, and occupational medicine. The Flight Surgeon is capable of recognizing and solving the problems of the crew member and the community and directs, monitors and supervises various talents toward this objective. The prevention or solution of problems will frequently require the full utilization of all available resources.

The Aerospace Medicine Program is very broadly conceived and involves a multidisciplined application of effort by many talented professionals. While flight surgeons direct the program, the efforts of clinical specialists, veterinarians, bioenvironmental engineers, aeromedical and preventive medicine technicians and supervisors, and other members of the Medical Service are indispensable in the conduct of the total program. It is exceedingly important to recognize the requirements for the varied skills and equipment available and to encourage and direct this support capability.

The Flight Medicine Program is specifically dedicated to the anticipation and recognition of the problems of the crew member and the proper use of available means to prevent or solve these problems. In the interest of emphasizing the multiplicity and complexity of problems that occur, it is worth mentioning a few broad categories of problems related to the crew member and aerospace crew effectiveness, and briefly indicate available means for their solution.

The physical and psychological selection of aerospace crew members remains one of the primary missions of aerospace medicine. This activity has become more critical with the advent of supersonic jet flight and manned space operations. The Flight Surgeon's contribution to selection is crucial

and depends upon the accurate and expert accomplishment of prescribed examining procedures in the application of the medical standards for flying. The procedures for medical examination are not included in the Flight Surgeon's Guide, since they are in AFM 160-1. That manual includes all medical standards, physical profile serial, and examining techniques for convenience of frequent correlative reference.

The problems related to flight-induced abnormalities and medical conditions, which may affect ability to fly, will require the application of the finest diagnostic abilities and the best of medical judgment. The condition may be acutely or chronically induced by the stress of flying or it may have some other cause. In any event, it must be diagnosed, properly treated, and thoroughly evaluated with respect to the individual's flying status. In the management of such cases, the Flight Surgeon maintains adequate administrative control of the flier to prevent untoward happenings which may occur when the unfit fly. Good medical care, personal observation, and proper performance of periodic medical examinations alleviate the many problems arising in this category.

The most critical problems are encountered in the area concerned with the protection of the flier against the hazards and stresses of flight. The complexity of these problems is readily recognized when one considers the many hazards and stresses encountered by the aircrews of modern operational aircraft. The hazards imposed by high altitude include hypoxia, decompression sickness, temperature extremes, cosmic radiation, and visual disturbances. The very high speeds produce stress through the application of accelerative forces—linear, angular, and radial—and by the production of extremely high temperatures. High speed also poses certain important visual limitations.

The occasional necessity for the flier to abandon his aircraft in flight presents many problems of escape compounding the problems of both high speed and high altitude. Inevitable crash landings and ditchings make it necessary to consider the problems of crash decelerative forces and the protection of the individual against these forces. In addition, medical problems are associated with survival and rescue under almost any circumstances and in every part of the world.

Many special stresses also may plague the flier. Some of these are: exposure to toxic substances, including those associated with aircraft operation and unconventional warfare; vibration, sound, ultrasound; the hazards of many types of projectiles; fire hazards, and circumstances that induce the sensory illusions of flight. The solution to many of these problems may be found in training in the use of survival and personal equipment, physiological training, and the medical indoctrination of aircrews. The Flight Surgeon is the key figure in the success of these important activities.

Another category of problems concerns those resulting from effects of prolonged physical, physiological, and psychological stresses. These problems may be considered to fall into three distinct groups. The first is that of *mission fatigue*, which is produced by prolonged application on a single mission and results in a temporary performance decrement that can be relieved rapidly by adequate rest. The second group is commonly termed *flying fatigue*, which amounts to a loss of keenness for flying or staleness induced by the cumulative effects of too much flying within a given period of time, often coupled with nonspecific everyday life stresses. This is usually reversible by a moderately extended period of rest. The last group consists of conditions referred to as *combat* or *operational fatigue*, which occurs in fliers as a consequence of exposure to the stress of combat flying. In general, this involves stresses such as heavy flying commitments, less than ideal living conditions, family separations, interrupted and changing schedules, and other problems that may compound to compromise skilled performance. All of these conditions require close observation, supervision, and special care by the Flight Surgeon. In no other problem

area is there a greater requirement for diligent and close personal observation of the flier.

The maintenance of a high level of physical fitness among all fliers may become, at times, a special problem for the Flight Surgeon. Certainly, the support given by the Flight Surgeon in the physical fitness program can be of immeasurable benefit to the effectiveness of the organization.

Nutritional problems arise frequently. Of particular interest to the Flight Surgeon are the difficulties encountered in affording adequate in-flight feeding for aircrew members. The Flight Surgeon must be concerned with both the sanitation aspects of food service and the many deterrents to adequate nutrition imposed by the in-flight situation. Usually, these problems can be solved through the effective teamwork of the Flight Surgeon and the food service personnel.

The medical aspects of flying safety present many important requirements. Problems of emergency crash procedures and casualty management must be met by proper planning and training. The investigation of aircraft accidents is a first consideration in the flight safety research program. The Flight Surgeon's part of the investigation often predominates because of the high incidence of human factors that cause accidents. The flying safety program of every activity should have the support of the Flight Surgeon.

Certain problems regarding the aircraft and its equipment are of concern to the Flight Surgeon in the interest of combat effectiveness. To recognize and evaluate these problems, the Flight Surgeon observes the flier closely in his crew position. Further, the Flight Surgeon considers any aspect of aircraft or equipment design that affects safety, comfort, well-being, and efficiency. This is particularly true from the standpoint of psychological, physiological, and anatomical considerations. In studying these problems, solutions or "fixes" may become apparent to the Flight Surgeon. To generate action, he may use the medium of the "Unsatisfactory Report." Similarly, he may report to the proper research agencies special observations which, ultimately, may result in important developments.

These various categories of problems of the crewmember and the recognition and application of the methods for their prevention or solution typify the Flight Medicine Program approach to aerospacecrew effectiveness. This program represents the major role of the Flight Surgeon in his support of the operational mission. Much of the specific knowledge essential to the accomplishment of such a program will be found in the pages that follow.

The Military Public Health and Occupational Medicine Programs which constitute the two other major functional parts of the Aerospace Medicine Program are discussed in a subsequent chapter.

REFERENCES

The reader should insure the currency of listed references.

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