ABSTRACT: The Physical qualification standards for aviation service used by the United States Army, Navy/Marine Corps, Air Force, and Coast Guard developed in parallel, diverging in many instances due to differences ranging from terminology to mission. Presently, standards and requirements for waiver vary widely between the services, in spite of minimal differences in aeromedical concerns for any given medical condition. Standardization or increased concordance between the services would have several advantages leading to more efficient and effective delivery of aviation medical support to the operational forces. This is particularly true in an increasingly joint operational environment. The authors have identified four major hurdles that must be overcome before the concept of joint aviation physical standards can be explored. These include: a difference in terminology including aviator classification, a difference in mission definitions and requirements, a difference in the processes of policy development, and a difference in the review and application of policies. These hurdles are explored, and suggestions for their mitigation are presented with open discussion following.

Keywords: Aerospace Medicine, Aviation Medicine, Physical Standards, Military Medicine

INTRODUCTION

The clinical practice of Aviation Medicine in the U.S. Military revolves around an administrative landscape of aeromedical policy and physical standards which are specific to the four main branches of the U.S. Armed Forces including the U.S. Air Force, U.S. Army, U.S. Navy/Marine Corps, and the U.S. Coast Guard. In today’s operational environment, Flight Surgeons are increasingly practicing in a joint military environment in which service members from different services must collaborate in order to accomplish the mission. In this joint military environment, Flight Surgeons are expected to be equally well versed in the policies and procedures of their sister services, as they provide aeromedical care for aviators and aircrew members from all services. Despite commonalities in aeromedical concerns, each service’s aeromedical policies have diverged over time, resulting in an often confusing and unnecessarily complicated joint framework for aviation physical standards. There is increasing pressure from high levels of U.S. Department of Defense leadership to consolidate aeromedical practices in many areas of support including but not limited to aviation medicine. This paper explores the hurdles encountered in developing a set of joint aeromedical physical standards and administrative procedures and proposes potential solutions to some of these problems. While these proposals are not intended to be comprehensive in nature, they are presented to raise awareness and initiate dialog between administrators throughout the aeromedical communities, with the goal of moving toward the authors’ vision of a single common system of aeromedical administration for the U.S. Military. The scope of this article is limited to the U.S. Military for the sake of brevity, but parallel analysis with other international Aeromedical standards, as many of the same lessons clearly apply in the international military aviation medicine community.

BACKGROUND

The idea of a unified approach to medical service for all branches of the U.S. Armed Forces is not new. With four separate medical departments in the U.S. Navy/Marine Corps, U.S. Army, U.S. Air Force, and U.S. Coast Guard, the efficient delivery of health care to armed service members and their dependants has long been complicated by stove-piping of resources and programs. One of the most energetic attempts to consolidate US Department of Defense medical services was put forth by Major General Norman Kirk in 1947. While Kirk did not originate this idea, he materialized the concept in a detailed plan that he presented to the Senate Armed Services Committee (13). Since that time, several more attempts have been made to propose a sweeping unification of all the armed forces medical services into one integrated service. In fact, the Civilian Health and Medical Program for the Uniformed Services (CHAMPUS) was a direct spin-off of these efforts.

While the authors do not necessarily advocate the unification of the medical services as a whole, the adoption of a common language and a set of common tools within the aeromedical communities of the individual services has several advantages. Issues as simple as which form to use for a flight physical, or which labs to order, or as complex as how to classify an aeromedical disposition or how to process a waiver evaluation frustrate the Flight Surgeon and often lead to duplication of work, or worse. Standardization or increased concordance between the services would lead to more efficient and effective delivery of aviation medical support to the operational forces both at the individual Flight Surgeon level as well as at the program administration level.

Clearly, each service has both shared (e.g., rotary wing) and unique (e.g. carrier landings) aviation functions, and each operational environment places unique physiological and psychological stresses on the aviator. However, equally clear should be the reality that the vast majority of medical conditions (e.g. cardiovascular disease) will have the same implications in an aviator who straps into any aircraft, regardless of type or paint color. Evidence-based practice mandates that Flight Surgeons separate their aeromedical analysis from...
political service-based policy boundaries, and continue to delineate with the highest degree of fidelity which conditions, and to what degree these conditions will have a different impact on aviators operating from different platforms based on valid medical evidence. By and large, this work has lacked the broader perspective of military aviation medicine as a whole. Increasing collaboration and improved distribution of labor will lead to improved policies and improved Risk Management for the entire military aviation community.

Our vision is very simple. We are advocating and have been working in what has proven to be a very political realm towards the simple goal of having one system in which flight surgeons can experience true interoperability, providing aeromedical services across service boundaries—an operational reality and necessity which we believe can no longer be ignored.

To this end, in 2002, the authors began a series of posters, panel discussions and working groups presented at international conferences including the Aerospace Medical Association Scientific Meeting and Medicine in Challenging Environments which brought together aviation medicine representatives from all the U.S. Armed Services in order to discuss and further delineate the possibilities for improved collaboration in the development of Aeromedical policy and practices. As a result of these and many other sidebar discussions, we are happy to report several significant movements and growing support for the vision of one common system of Aeromedical administration.

AEROMEDICAL DECISION MAKING PROCESS

Critical to the process of joint aeromedical administration, must be a common system of evidence-based decision making and analysis. Doctors Sauer and Woodson described the Aeromedical Decision Making Process (1) as an analog of Operational Risk Management applied to aviation medicine clinical and policy decisions.

The goal of the Aeromedical Decision Making Process is to "prevent aviation mishaps due to physical or medical deficiencies... without unnecessarily restricting (military) aviation." It is the method that Flight Surgeons employ in order to evaluate specific conditions and crewmembers for entering or remaining on aviation service.

Within this framework, aeromedical policy and physical standards for aviation service are viewed as risk management controls to increase aviation safety. The effects of a given medical condition must be evaluated on an individual and population basis in order to assess the impact upon severity and probability of contributing to a mishap or mission failure.

When applied to policy development, this process provides an objective means by which to evaluate the common Aeromedical concerns for a given medical condition which all sister services share, while attending to the specific differences in mission requirements free from the individual bias which has long skewed aeromedical policy. It should be noted that mission differences, rather than service differences, drive this aeromedical risk assessment process based on the real and observed aviation operating environment. The commonalities between service-specific considerations for a specific mission or platform type far outweigh the differences.

The first hurdle to overcoming service boundaries in aviation medicine may very well be to adopt a common framework for the discussion and evaluation of aeromedical concerns. This model provides such a framework and may supply an efficient means for converting available medical evidence into better risk controls and aeromedical policies which serve all aircrew and flight surgeons regardless of nationality or service membership.

HURDLES TO JOINT AEROMEDICAL STANDARDS

Each of the U.S. armed services enjoys its own unique culture and challenges. These may range from simple differences in language to more complex significant mission requirements such as accounting for the additional challenge of performing an aircraft carrier landing. An effective joint system for aeromedical administration must account for these differences. Before moving forward with any type of program implementation, we must first reach consensus on what hurdles these differences may present. As this question has been analyzed, the authors have identified four primary hurdles: 1) a difference in terminology including aviator classification, 2) a difference in mission definitions and requirements, 3) a difference in the processes of policy development, and 4) a difference in the review and application of those policies.

DIFFERENCES IN TERMINOLOGY

Individual service cultures and administratively defined functional landscapes have contributed to the development of non-standard terminology in aviation medicine. While the meaning in most cases translates in the same manner, it is difficult for members of one service to understand a sister service’s policy or program. This difference in terminology is that they can be misleading and cumulatively, normally inferred. The important thing to recognize is that they can be misleading and cumulatively, they do create confusion when working in a cross-cultural aviation medicine environment. More importantly, such language will have to migrate to towards commonality as joint policies, procedures, and systems are developed.

More troublesome than differences in language is the variance in aeromedical classification systems of the different services. Looking at the differences between the U.S. Air Force and U.S. Navy aeromedical classification systems, different approaches are immediately evident (Table 1).

Aeromedical policies are designated for specific classes of aviators as outlined in Table 1.

The wide variation in terminology used illustrates our incongruities. Even simple concepts such as the retention of a service member on active duty, the status of an individual’s physical and mental condition for flight, or identification of the service member’s work code specialty each have different nomenclature between the services. For example, the Army and Navy may refer to “Retention” while the Air Force may refer to “continued military service.” The Air Force may refer to an aviator who does not meet designated physical standards for aviation as “Not Qualified” while the Army refers to the same aviator as “Disqualified” and the Navy as “Not Physically Qualified (NPQ).” The Army and Air Force will describe physical limitations as “profiles” (based on a system of physical profiling as outlined in the respective aviator classifications) whereas the Navy will describe “Limited Duty.” Similar terminology differences abound in the regulations across service boundaries.

Most of these language differences are not critical in nature. Certainly, a common meaning is normally inferred. The important thing to recognize is that they can be misleading and cumulatively, they do create confusion when working in a cross-cultural aviation medicine environment. More importantly, such language will have to migrate towards commonality as joint policies, procedures, and systems are developed.

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Aeromedical policies are designated for specific classes of aviators as outlined in Table 1.

Air Force

| Class 1: Pilots (Naval Aviators) |
| --- |
| Service Group I: unrestricted (including night carrier operations) |
| Service Group II: no shipboard operations (except helicopter) |
| Service Group III: dual-control only; with SIG I/II copilot |

Navy

| Class 1: Other aircrew (Naval Flight Officer, Flight Surgeon, etc.) |
| --- |
| Class 2: Air Traffic Controllers, UAV operators, etc. |

Army/Coast Guard

| Class 1A: Initial pilot applicant (Commissioned) |
| --- |
| Class 1W: Initial pilot applicant (Warrant) |
| Class 2: Rated aviator |
| Class 2F: Flight Surgeon, Aeromedical Physician Assistant |
| Class 3: All other aircrew (crew chiefs, gunners, flight medics, aerial observers, maintenance aircrew, flight surgeons, etc.) |
| Class 4: Air Traffic Controllers |

Table 1: Aeromedical Classification Systems

Figure 1: The Aeromedical Decision Making Process
Aeromedical disposition in each service is grounded in its own aeromedical classification system, each of which have developed through an amalgam of service culture and regulatory framework entirely outside the realm of aviation medicine. It is fairly easy to recognize that these classes are defined in each service based on fundamentally different frameworks. In many cases, the difficulty in interpreting aeromedical physical standards is rooted in the differences in these classification systems. It is difficult to see a truly joint aeromedical system that uses the current service-specific airflow classification structure. Standardization of this system into a common inter-service airflow classification structure would seem the only plausible solution to this problem and a vital step towards unification of aeromedical standards in the U.S. Military. Several solutions may present themselves, but one potential solution could be based upon crewmember type and basic aeromedical distinction. There are only four essential types of individuals who require aeromedical clearance, each of which represents unique job-related physical requirements: 1) flight crew who control aircraft, 2) flight crew who do not control aircraft (crewmembers who perform ancillary duties in flight (aerial observers, weapons system operators, equipment operators, etc) unrelated to the control of the aircraft (e.g. single pilot vs. multi-crew aircraft). However, each type of aviation platform places its own unique set of physical demands on the aviator, while many demands are common to all aviation platforms.

Aeromedical concerns are more appropriately described in reference to the mission the aircrew member is serving than to the branch of service of which he or she is a member. There is no doubt that due diligence must be paid to the physiological demands of specific missions and equipment on the crewmember. It must be noted, however, that these demands are grouped into categories that transcend service boundaries. The present system effectively prevents aeromedical categorization of missions across the services. More importantly, it frequently does not even account for actual physical stresses on different categories of crew members within a given service. An effective framework for aeromedical standards would appropriately account for differences in physiological demands based on mission, equipment, environment, and other job requirements.

One example of the failure to consider mission specific physical demands is illustrated by looking at the standards for stereopsis in Army aircrew. Current policy allows deficiencies in stereopsis on final approach and landing phases of flight which are within the stereoscopic range, and back-end helicopter crewmembers’ duties would not routinely call on their stereoscopic capability as they manage payload. Yet evidence supports the idea that monocular pilots (without stereopsis) do just as well as binocular pilots in landing operations. The key point is that adoption of a common inter-service classification structure such as that presented in tables 2a or 2b would facilitate cross-service communication and allow for a common framework for aeromedical regulations, moving us much further down the road towards a unified joint aeromedical system.

FRAMEWORK FOR STANDARDS DEVELOPMENT (MISSION VS. PHYSIOLOGY)

The major services of the U.S. Armed Forces frequently distinguish themselves based upon their stated mission. On the most basic level, these missions may be categorized based upon service distinct missions (e.g. land-based vs. carrier-based operations, the platform flown (e.g. fixed-wing vs. rotary wing) or the complement of crew (e.g. single pilot vs. multi-crew aircraft). However, each type of aviation platform places its own unique set of physical demands on the aviator, while many demands are common to all aviation platforms.

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corresponding aeromedical stressors and that person’s physical and mental capabilities. More appropriately, the categories may be organized so that the service member is fully qualified for all categories except for those indicated. One example of this classification, as it might appear on a joint aero-medical clearance chit (up slip) is seen in Figure 2.

Such a system would allow classification of pilots, flight officers and enlisted crewmembers, regardless of service, based upon physical and mental capabilities from an aeromedical perspective. With the increasing incidence of exchange tours, particularly among pilots between the services, this system would allow a common basis of categorization, further helping to eliminate the “language barriers” that exist between the aeromedical branches of the Army, Navy and Air Force.

DIFFERENCES IN THE PROCESSES OF POLICY DEVELOPMENT

Currently, each service maintains parallel analogous organizations which develop and implement aeromedical policy (Code 42, Army Aeromedical Activity (AAA), Aeromedical Corporate Board, Aeromedical Consult Service, Aeromedical Advisory Council, etc.) Each service also maintains its respective process for submission, review, and disposition of aeromedical standards as well as policy development. These organizations and processes serve a vital role in maintaining safety and quality in aviation medicine.

As we consider the convergence of aeromedical systems, each service must ensure that its administrative aeromedical system continues to serve its own interests. Migration towards a common process and waiver guide is a step-wise approach and must ensure that these interests and representation are maintained. The authors do not advocate for or suggest a radical course change, but rather a common effort towards commonality. We have already begun to work toward this end and are sharing information better than ever before.

In today’s aeromedical environment, waiver policies are usually modified with at least some modicum of collaboration between the services. Joint policies are in some cases being adopted, and convergence into common electronic systems is evolving. Some of these will be discussed later in this article.

Ideally, however, services could eventually move (when collectively ready) towards some system of formal “joint aeromedical council” or board which could manage a truly joint aeromedical waiver guide and/or disposition system. This idea may seem alarming to some, but the important thing to recognize is that there is an entire spectrum of possibilities to consider, including formal and informal processes and systems. In order to sustain a joint process we will need to establish some kind of mechanism by which Aeromedical policies are developed, considered, implemented, and modified while protecting the interests and concerns of all the services. While clearly not comprehensive, Table 4 illustrates a stepwise approach which could move us carefully in the joint direction.

DIFFERENCES IN REVIEW AND APPLICATION PROCESS

While medical conditions may be interpreted differently by each service, or in aircrew members flying different mission platforms, most Aeromedical Physical Exam requirements are (and should be) based on sound medical/public health screening principles, and should not vary by service or mission.

One of the easiest and highest yield obstacles we can overcome is that of unifying the actual requirements for initial and periodic aeromedical evaluations across services and mission platforms. Wading through the service-specific regulations and instructions, we identify a grossly incongruent set of physical exam requirements. Differences exist in issues as simple as who is required to undergo ECG testing, or who must have a G6PD, urinalysis, or lipid panel. Chest X-rays do not share common mandates and each service has its own variation of anthropometric testing and cardiac risk profiling. You will seek the same outcome. Most of these differences probably reside not in the medical merit of the tests themselves, but in the differences in policy development as outlined previously. Yet these differences are extensive; they are the culprit in wasting numerous man-hours when an aviator from one service is forced to complete a physical with a second service-flight surgeon which does not meet his service standards.

Adoption of a single, unified set of diagnostic testing requirements for initial applicants and established aircrew members should be fairly simple to achieve and would represent tremendous progress toward commonality. The net effect of this one change would be a dramatic improvement in interoperability of the flight surgeon in the joint environment.

Another hurdle which presents a fairly simple opportunity for convergence is found in the paperwork drill. In spite of Department of Defense level efforts to standardize the physical exam forms in the DD2807 and DD2808, we have not seen universal adoption of these forms in aviation medicine. Additionally, our abbreviated physical exam forms for interim flight physicals remain distinct. Forms represent a standardized method of collecting and presenting basic clinical data and are critical “glue” for the aviation medicine program. In addition to the joint up chit described previously, adoption of a common “short form” and agreement to utilize the DD2807/8 for comprehensive physicals in all services would appear an easy fix and should not encounter significant resistance within individual service cultures.

Another opportunity for convergence exists in our method of submission, review and disposition of aeromedical evaluations. Each service retains its own authoritative body on disposition. Traditionally, physical exams were submitted on paper to the corresponding administrative body (AAA, Code 42, ACS, etc) for review. Modern world-wide-web technology has presented the possibility for a new model for review and disposition which may potentially bring us closer together. A common internet application shared by the service authorities would better facilitate cross-communication between aeromedical specialists and provide for a common process which would better facilitate joint aeromedical communications and research.
THE AEROMEDICAL ELECTRONIC RESOURCE OFFICE (AERO) AND CURRENT JOINT INITIATIVES AS A PATHWAY TO CONVERGENCE

Opportunities to converge towards common systems, policies, and practices abound and do not require a monumental overhaul of what is currently in place. While compromise is important, the service-specific aeromedical authorities do not need compromise on their standards or requirements, but can find common ground. One example of such endeavors can be found in recent developments in the integration of the Aeromedical Electronic Resource Office (AERO) at Fort Rucker, Alabama.

In 2002, the U.S. Army Aeromedical Activity (USAAMA) adopted AERO as an internet-based solution to aeromedical review and disposition, replacing a cumbersome paper-based submission process in the Army. This government-owned and developed system was fielded, and over a short period of time, resulted in significant improvements in the disposition of Army flight physicals. In addition to improving the submission process, internal processing times at USAAMA were reduced from 150 days to 1-2 days on average, while also making provisions for immediate review when necessary. AERO provided for data checking and was easily integrated into the Army’s Flight Surgeon’s office, both CONUS and OCONUS in the deployed setting. Administrative errors on submitted physicals were reduced from 40% on the paper-based system to <1% on AERO, and immediate feedback was provided to the Flight Surgeon on the disposition of aircrew physicals. Backlogs were cleared and overall efficiency was dramatically improved.

In 2008, with provisions similar to those experienced using the Army’s paper-based systems, steps were taken independently in the U.S. Navy to implement AERO as their system for aeromedical disposition and review. While still undergoing testing and implementation in both services, it is already clear that this system has the potential to make significant improvements in the process of disposition and allows for commonality on an entirely different level than ever before.

There are several points about this AERO migration which must be emphasized. Firstly, the Army, Coast Guard, and Navy all shared a similar pathway for review and disposition within their own organizational structures (e.g. all three use a centralized review authority). Secondly, the Coast Guard and Army share a common footing in aero-medical culture as a result of the sharing of a common training base for Flight Surgeons, and a common migration of Army Flight Surgeons into the Coast Guard medical service. Thirdly, in the case of the Coast Guard, the aeromedical exam parameters (items required for physical exams) were already very similar. To cement these similarities, the Coast Guard agreed to adopt the same standards utilized by the Army, and Code 42 in the Navy has worked diligently to more closely align physical exam parameters with the Army and Coast guard in order to facilitate AERO integration.

The opportunity presented by Navy and Coast Guard AERO integration allowed USAAMA to make some minor modifications to AERO to account for differences in requirements within the Navy’s aeromedical policy. Without modification, the process of review within AERO very easily accommodated differences in the waiver process in both services. Because AERO utilizes a role-based system, the actual waiver authority could be retained in the service and allow for service-specific review while allowing all three services to utilize a common system and begin to migrate specific physical exam parameters, beginning to overcome one of the previously mentioned hurdles to commonality.

While AERO is only one system and one example, it serves the purpose of this article, as a vivid example of the capacity for convergence towards the authors’ vision of a single common aeromedical system, while simultaneously raising the program standards within each individual service.

CONCLUSION

The prospect of developing a joint AERO system and Waiver Guide is clearly conducive to flight safety. Aviat Space Environ Med 2012;83(5):699-700.

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Walter Dalitsch III (MD, MPH) is a Navy and Marine Corps aerospace medicine specialist who has just completed a three-year tour as the faculty flight surgeon for the Navy’s School of Aviation Safety in Pensacola, Florida. He has assumed duties as the Force Surgeon for the Naval Air Forces, Pacific Command, headquartered in San Diego. Prior to the Navy he worked as the daytime emergency room physician and nighttime radio dejay in the Alaskan Yup’ik Eskimo village of Bethel. He has published and presented extensively on the history of aviation medicine, is a life member and Fellow of the Aerospace Medical Association, and enjoys flying in his spare time.

James S. McGehee (MD, MPH) is certified in aerospace medicine and is the senior consulting flight surgeon for the US Army Aeromedical Activity, Fort Rucker, AL. He earned his medical degree from the Medical College of Virginia and his public health degree from the Johns Hopkins University. He completed a distinguished career in the United States Army serving in a variety of capacities including Dean of the US Army School of Aviation Medicine, Commander of the US Army Aeromedical Research Lab and Consultant to the US Army Surgeon General for Aerospace Medicine. Prior to his medical career, he earned a master’s degree in environmental engineering and worked for the US Navy. He has authored a number of publications, principally in the field of aerospace medicine.

Justin Trevor Woodson (MD, MPH) is a Lieutenant Colonel in the United States Army. He is currently a family member, in the United States Army Medical Center and Emergency Medicine and fellow in Military Medical History at the Uniformed Services University of the Health Sciences (USUHS) in Bethesda, MD. LTC Woodson is a Flight Surgeon and a Dive Medical Officer (DMO) and is Board Certified in Aerospace Medicine. LTC Woodson’s primary care emphasis has been in applied operational medicine in unusual environments and he enjoys a diverse training background and series of personal pursuits that suits his passion for new experience and hands-on discovery.

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