

Rationale for Embedded Musculoskeletal Care in Air Force Training and Operational Units

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Recently, momentum toward implementation of sports medicine teams in the US Air Force (USAF) has increased. The usual care model, with primary care referrals, 15-minute appointment slots, and tedious specialty appointing, is inadequate for many military members with musculoskeletal injuries. Although the USAF Academy maintains a top-notch sports medicine program for its intercollegiate athletes, the tactical athletes of USAF special operations training units have access to meager sports medicine facilities and services. Efforts to embed sports medicine teams within these units have recently begun. Due to the high cost of training and high attrition rates, even a 10% reduction in medical attrition may bring cost savings exceeding \$2.5 million annually. Examples of sports medicine (eg, Navy Sports Medicine and Reconditioning Team [SMART] clinics) and athletic performance optimization clinics (eg, EXOS, P3 [Peak Performance Project]) styled like athletic training facilities are becoming more prevalent and provide models for success. We recommend continued efforts to provide excellent sports medicine care to USAF personnel.

The US military has led the way in many areas of medicine, generating innovative research efforts and defining best practices for all to follow.^{1,2} Critical-care air transport¹ and the use of blood products in trauma resuscitation² near the point of injury are excellent examples. However, in other areas, such as musculoskeletal injury prevention and performance optimization, the military has followed civilian entities at the forefront. Epitomizing this construct are embedded sports medicine teams (SMTs), which provide a model of exemplary musculoskeletal care and have long been the standard for collegiate and professional sports teams.^{3–7} Given that musculoskeletal injury (MSK-I) accounts for the greatest number of medical visits and lost duty time in military populations,^{8–10} there is an obvious need for effective and efficient methods of primary and secondary injury prevention, as well as timely and proficient assessment, treatment, and rehabilitation of these prevalent injuries. To address the MSK-I burden in service members, SMTs have begun to be adapted for military settings over the past decade in numerous Army,¹¹ Navy,¹² and Marine¹³ units. Although these 3 services have already invested significant funding and personnel to create SMTs of varying compositions, similar efforts in the USAF have generally lagged behind (with the exception of small-scale efforts in the Air Force Special Operations Command). Recently, momentum toward SMT implementation in the USAF has picked up,

and locations now include Moody Air Force Base's Warrior Athlete Center of Excellence, which provides care for Air Force pararescuemen, Base Defense Squadrons, and Explosive Ordnance Disposal personnel. In this article, we present the rationale for continued efforts at all levels of leadership, from medical treatment facilities up to Air Force headquarters, to provide superior sports medicine services for Air Force personnel as a bridge to human weapon sustainment and performance optimization. The SMT model can be adapted, scaled, and applied to all airmen, but the greatest return on investment is expected within high-value, hard-to-train, hard-to-replace specialties.

All members of the USAF (ie, airmen) are required to be physically fit. Although certain career fields require extraordinary fitness, all airmen must maintain adequate levels of physical fitness, not only to perform their duty-related tasks but also to achieve passing scores on biannual physical fitness assessments in order to qualify for deployments and maintain active-duty status. Yet, should airmen suffer MSK-I or need rapid evaluation or treatment to maintain their physical fitness efforts, they must generally wade through lengthy primary care referrals, neatly partitioned exam rooms, 15-minute appointment slots, and tedious specialty appointing, all of which can delay accurate diagnosis and definitive therapy for more than a month. This model is administered fairly easily, but it does not serve injured airmen or the mission well, and few options exist for quality, timely musculoskeletal care.

The prototype SMT in the USAF is at the US Air Force Academy (USAFA). For many years, intercollegiate and recreational athletes at the USAFA have enjoyed outstanding sports medicine and human performance services. Currently, 636 USAFA cadet athletes participate in 27 men's and women's sports, representing the USAF on a national stage. They are served by 16 full-time certified athletic trainers, 6 certified strength and conditioning coaches, and 5 team physicians, including 2 primary care sports medicine specialists.¹⁴ Furthermore, these providers and athletic programs are housed in some of the finest facilities in the Air Force's inventory. Undoubtedly, funding from the National Collegiate Athletic Association (NCAA) and media coverage for sporting events contribute to the abundance of resources for this military sports medicine program, which is comparable with sports medicine services at large, civilian NCAA Division I athletic programs.

The USAFA SMT is in stark contrast to the bare-bones medical and athletic support resources available to tactical

Table. Attrition Rates and Estimated Costs From Combat Control, Pararescue, and Tactical Air Control Party Training, 2008 to 2010^a

Course	No. of Attritions	Graduation Rate, %	Medical Cause for Attrition, No. (%)	Cost per Fully Trained Graduate ¹⁵ (\$)	Annual Cost Savings if Medical Attrition Decreases 10% (\$)
Combat Control	575	14	140 (24)	93 602	436 809
Pararescue	1043	1	320 (31)	210 536	2 245 717
Tactical Air Control Party	134	60	98 (73)	57 137	186 647
Total					2 869 173

^a Attrition data obtained from training squadron record-keeping system. These estimates are based on the assumption that each attrition results in the loss of the full training cost of 1 trainee, whereas the true cost may be less than this if attrition occurs early.

training operations of the 350th Training Group, the Air Force's only organization that provides all initial skills training to Pararescue, Combat Control, Special Operations Weather, Tactical Air Control Party, and their officer counterparts. The operational demands placed on these airmen require them to be nothing short of high-performance tactical athletes. These personnel will be responsible for fighting the war against terror and saving American lives in combat and humanitarian assistance missions. The operational deployment tempo for these high-demand, limited-supply airmen is near the peak in the USAF. However, the sports medicine and human performance services offered to these airmen pale in comparison with those of our USAFA intercollegiate athletes: the 350th must "stand in line" with approximately 65 000 other trainees per year from all other technical training squadrons and international training units at Joint Base San Antonio (JBSA)-Lackland, all of whom receive medical care from a single primary care and flight medicine clinic.

Until November 2014, musculoskeletal care for trainees at JBSA-Lackland was conducted mostly through primary care referrals to a hospital-based physical therapy clinic, although some physical therapists provided on-site care for the 350th on an informal, limited basis. Frequent high-risk training events (8- to 10-mi [13- to 16-km] rucks with 50-lb [23-kg] rucksacks in the south Texas heat, long-distance runs, underwater swims in full gear) are usually supported by no more than a single medic, who must often be borrowed from other organizations to provide emergency medical coverage. However, airmen with MSK-Is have traditionally been required to leave training and make an appointment at the Trainee Health Clinic, where they are often seen by young physician extenders with little training in MSK-I care and little exposure to the training demands of the 350th. This medical care results in missed training time and the "wash-back," or elimination of trainees. Due to the costs and negative effects of MSK-Is at JBSA-Lackland, a primary care sports medicine physician (N.S.N.) was brought on in August 2014 to provide dedicated MSK-I care for the trainee population, including the 350th. Six certified athletic trainers were hired in November 2015 (2 of whom serve the 350th), and a physical therapist and an occupational therapist have recently formalized part-time duties in the 350th (while working to secure full-time duty), marking the birth of the first embedded, multidisciplinary sports medicine team within the Air Force training environment. With this SMT in its first year of operation, data are being carefully collected to document the outcomes and to guide future efforts in potentially placing SMTs within other training units.

The argument for providing more robust sports medicine services (including personnel, facilities, and equipment) to training units at JBSA-Lackland is compelling. Physical training and rehabilitative facilities for the 350th currently

include a 60-year-old off-site swimming pool, makeshift weight room, and part-time physical/occupational therapy space tucked into an old, repurposed dining facility (where barbells have been known to break the floor). Although great sports medicine can be delivered in almost any facility or any environment, there is a case for providing higher-level equipment and facilities to the tactical athletes who defend our Constitution on the front line each and every day. The time savings alone from offering on-site specialized care instead of appointment-based, referral-based, remote clinic care are just a start.

Many trainees (especially special operators) hide their injuries for fear of being removed from operational status. This fear is the result of a lack of trust and understanding between the trainee and the health care provider. Embedding health care providers into operational organizations to ensure that they understand the mission and know the people will significantly bridge this gap.

It is anticipated that the sports medicine services will more than pay for themselves based on the projected cost savings from reducing attrition rates. A 10% relative reduction in medical attrition across the Pararescue, Tactical Air Control Party, and Combat Control training courses would likely result in savings of more than \$2.5 million annually (Table). Though it is difficult to represent a complex system in simple statistics, these estimates of cost savings are conservative in several ways. Some of the reported training costs do not include the cost of airborne training, nor do these figures account for the cost of delays in training, such as when an injured trainee is washed back from a training course and spends several weeks to months before reattempting the course (at approximately \$225 to \$250 per day per trainee). Finally, these estimates do not take into account the added expenses of marketing for and recruiting a replacement for each of these unprogrammed losses. Currently, the Air Force Recruiting Service reports that approximately 40% of their efforts are spent on these critical few career fields (A.T. Haygood, written communication, October 2015).

Lessons learned from other military embedded sports medicine clinics can guide these efforts. The first discussions about embedded SMTs began in the 1990s, with the US Marine Corps and Navy recognizing the need for dedicated sports medicine professionals to provide on-site rapid assessment and care.¹⁴ Early examples of this need being addressed are the sports medicine injury-prevention initiative in US Marine Corps Basic Training¹⁶ and the Navy model of SMART clinics, which both began in the early 2000s.^{12,16} The use of SMART clinics has decreased the number of limited-duty days and the number of sailors referred for musculoskeletal-related medical discharge.¹² Thus, SMART clinics are now commonplace at a large number of naval bases worldwide. Army examples of military SMTs include the Warrior Athletic

Training Program efforts at Fort Benning¹⁷ and Army Special Operation's THOR3 (Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning) program.¹⁸

Key to the success of these embedded SMT examples are certified athletic trainers in embedded clinics backed by sports medicine physicians and support staff.¹² These models offer rapid access to a team of dedicated sports medicine providers who can coordinate on-site care in a timely manner. Although the ideal balance of providers (eg, certified athletic trainers, strength and conditioning coaches, exercise physiologists, clinical and operational psychologists, sports nutritionists, physical and occupational therapists, and sports medicine physicians) varies in each setting, a multidisciplinary model including certified athletic trainers, physical therapists, and sports medicine physicians is critical to success (J. Biery, written communication, May 2015; S. J. Blivin, written communication, May 2015).¹² This setup is also similar to the multidisciplinary approach of many successful high-level athletic performance training clinics, such as EXOS and P3 (Peak Performance Project). These specialized athletic performance clinics are resource and technology intensive and are not entirely feasible in large training populations, but they can be adapted to smaller groups of highly trained tactical athletes, such as the 350th. Furthermore, the basic concepts of identifying risk factors for injury and translating these findings into injury-prevention programs and targeted postinjury rehabilitation methods can be readily applied to all military training populations. Aligning military SMTs with this framework could have a huge effect. Most importantly, these findings must then be shared and discussed with those responsible for developing and implementing military training to further move injury prevention in the right direction.

Ultimately, these resourcing decisions should be made by the local leadership based on organizational mission requirements. These will vary greatly between basic military training (high volume of trainees, many with low physical fitness, moderate physical training intensity, controlled and uniform training environment) and special operator training (lower volume of trainees, highly capable and determined athletes, high-intensity physical training, highly diverse training environments). We hypothesize that eventually making appropriately scaled SMTs available to most or all active-duty Air Force personnel may be an effective way to reduce the effects of MSK-Is, which remain the most prevalent health problem in the military and the leading cause of lost duty days and the inability to deploy.^{10,19} If outcomes data show benefits in the basic military and special operations training populations, future authors should evaluate the effectiveness of SMTs in other military populations.

DISCLAIMER

The opinions expressed in this document are solely those of the authors and do not represent an endorsement by or the views of

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