Athletic Trainer Integration within US Air Force Basic Training

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FINAL REPORT

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DECLARATION OF INTEREST

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Trends & Trajectories of Prescription Opioids in the Military Health System

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1.0 EXECUTIVE SUMMARY

To address the highest single cause of medical attrition in United States Air Force Basic Training, we conducted a study to evaluate the impact of integrating a team of Certified Athletic Trainers with a board-certified sports medicine physician. The team of certified athletic trainers was integrated into one of six training squadrons with outcomes compared against two control training squadrons after 36 months of intervention. At the completion of this study, the squadron with integrated athletic trainers had 25% lower MSK attrition and 15% lower attrition for any cause compared to control squadrons. In addition, the intervention squadron demonstrated improved fitness scores, decreased incidence of stress fractures, and decreased referrals for specialty care (orthopedics and physical/occupational therapy). The cost avoidance due to saved attrition in the intervention squadron amounted to $10.9 million. Interim analysis half way through this study showing persistent improvement in MSK attrition was used to justify decision by Air Education and Training Major Command to fund a full expansion of integrated athletic trainers throughout all USAF Basic Training. This study demonstrates the success that can be achieved when medical expertise targeted to a specific identified threat to mission success is integrated within an operational unit in the USAF.

2.0 INTRODUCTION

Operational Impact of Musculoskeletal Injuries in Military Training

United States Air Force (USAF) recruits must pass through Basic Military Training (BMT) before becoming a uniformed service member. Discharge from basic training may occur secondary to poor performance, fraudulent enlistment, mental health difficulties, and medical issues. During fiscal year 2014, 6.8% of all trainees (5.4% of males and 8.5% of females) who entered Air Force basic training were discharged; 3.3% of these (2.5% of males and 5.7% of females) were discharged for medical reasons (unpublished data, Trainee Health Surveillance). A review of all cases of medical attrition between fiscal years 2010-2014 found that 49.5% of cases were attributed to a musculoskeletal injury (unpublished data, Trainee Health Surveillance). Lost training time and delayed graduation due to overuse injuries, such as patellofemoral pain syndrome, exercise-related, lower-leg pain, plantar fasciitis, and Achilles tendonitis(1), comprised the greatest disability expense following separation from the military.(2, 3) Stress fractures require heightened attention due to their potential for long-term disability.(4-6) The incidence of stress fractures among military recruits is 18 times higher than among non-recruits.(7) Causes likely include the repetitive cortical micro-trauma associated with high-intensity activities such as running and marching, the sudden increase of such activities upon entering basic training, and insufficient time for recovery.(8, 9) The costs associated with recruiting, in-processing, housing, and training each individual are roughly estimated at $50,000 per trainee assuming a full 8 weeks of training. Excess training costs are accrued when graduation is delayed due to injury. The investment in a trainee will ultimately be lost if separation during training occurs. Long-term injury and disability further cost the taxpayer extensively, while negatively impacting the life of the would-be United States airman. Systemically, military readiness may be impacted when too few trainees graduate and not enough enter their advanced training on time. This increased risk to military readiness elevates the importance of mitigating losses due to injury.

Unlike sudden traumatic fractures, stress fractures develop insidiously after a progression from physiologic to pathologic bone stress response.(7) Risk factors for this spectrum of injury include errant movement patterns, poor fitness, poor nutrition, and muscle imbalances; all of which are targets for intervention. The current model of medical care for USAF trainees

complaining of MSK-related pain begins with a self-referral or referral by training leaders to medical technicians for initial evaluation and triage, who then refer the trainee to the primary medical care facility for basic trainees (Reid Health Services Center). This process can cause days of lost training time for any individual. A medical provider (physician, physician assistant, or nurse practitioner) evaluates the trainee and frequently writes a waiver from training activities lasting upwards of two weeks to curtail ongoing stressors and allow time for healing. Physical therapists rarely get the opportunity to regularly engage with trainees as their primary role directs their attention towards active duty and permanent party personnel. Streamlining the flow of patient care within basic military training could provide an avenue to help improve outcomes for both the training and medical wings involved with trainee preparation. Early recognition of overuse and pain presentation in conjunction with corrective therapeutic care may allow curtailing of insidious onset issues from progressing to a stress response.

Review of Literature

Athletic trainers (ATCs) are commonly employed by schools to help with training and assist in providing comprehensive medical care for MSK concerns for student athletes. This unique position makes ATCs acutely aware of various stakeholder needs to include coaches, parents, physicians, and students. Required ATC involvement ensures effectively improved outcomes for all stakeholders through prevention and direct patient care.

The impact of ATCs in occupational settings is well-documented. An ATC-run workplace rehabilitation program for injured employees at St. Mary's Duluth Clinic Health System significantly reduced lost work days and more than doubled the odds of return to work within three weeks of implementation.(10) Additionally, at General Motors' rehabilitation and fitness center, in-house rehabilitation provided by two ATCs saved $3.5 million between 1988 and 1991.(11) It is well reported in the literature that integrated ATCs into sports medicine physician clinics increased patient throughput by 22%.(12)

Despite limited military published data, ATCs have been employed in all military branches and the U.S. Coast Guard.(13-15) One notable study conducted by the U.S. Army Public Health Command compared athletic trainer teams to musculoskeletal action teams (MATs) in Army training at Fort Leonard Wood from June 2010 to December 2011. MATs consisted of a physical therapist, physical therapy technician, two ATCs, and two strength and conditioning coaches. Both groups were found to be effective at reducing injuries and medical encounters. Compared to baseline, the number of injured males seen during the intervention phase decreased 17% in the MAT group and 22% in the ATC only group. For females, respective declines were 22% and 19%. Medical attrition was significantly reduced in the MAT group for males (44%; $p<0.01$) and females (50%; $p<0.01$). In the ATC only group, medical attrition was non-significantly reduced for males (17%; $p=0.35$) and females (6%; $p=0.79$).(13) However, the use of a historical comparison group makes it difficult to judge the impact of either group.

At Marine Corps Base, Camp Lejeune, the traditional sports medicine clinic was updated in 2008 to an open-bay, multi-disciplinary clinic, where sports medicine physicians, physical therapists, and ATCs worked together. This collaboration called the Sports Medicine and Reconditioning Team model reduced orthopedic surgeon referrals and the percent of limited duty profiles progressing to physical evaluation boards when compared to historical controls.(14) Although ATCs have not been assigned a formal military scope of practice by the Defense Health Agency, they are recognized by the American Medical Association as essential elements within a sports medicine plan of care.

The purpose of this study was to assess the impact athletic trainers had working from

within the training squadrons as a part of a comprehensive sports medicine team by measuring improvement in operational, medical, and fiscal outcomes compared to current standard of care controls.

3.0 METHODS

Setting and Population

Citizens and permanent residents of the United States who wish to enlist in the U.S. Air Force must meet baseline eligibility criteria(16) and complete an intensive 8-week training course at Joint Base San Antonio – Lackland, Texas. Over 35,000 new recruits begin the course each year, with approximately 95% graduating as U.S. Airmen. With the exception of those who are pre-selected for special warfare training or the US Air Force band, incoming recruit trainees are randomly assigned to one of three basic training squadrons. Each squadron is housed in its own 4-floor dormitory and shares a cafeteria and fitness complex with one other squadron. At any given time, a squadron may consist of 400-800 trainees at various stages of the training course. In addition to daily marching and drilling, trainees participate in 45-60 minute physical training sessions on most days; workouts have been described previously(1). Primary medical care is provided at a clinic near the training campus, with specialty and inpatient care available at other facilities on or off the installation.

Trainees who sustain minor injuries may be returned to training with profiles prohibiting certain activities for predetermined lengths of time, usually less than a week. Trainees deemed unsafe to continue training—whether due to severe injury or another medical or mental health issue—are removed from their squadron and reassigned to the "Medical Hold" unit. Trainees who cannot pass their final fitness assessment, but who otherwise qualify for graduation, are transitioned into the "Get Fit" flight, where they focus on improving their fitness. Trainees in Medical Hold or Get Fit may eventually return to training and graduate, or they may be temporarily or permanently separated. Separation or "attrition" from basic military training is coded based on the underlying cause: medical; mental health; performance; and administrative. Medical attrition is further classified by organ system and diagnosis, and musculoskeletal attrition is sub-classified by anatomic site. Although the dichotomous outcome of attrition or graduation is of supreme importance for military readiness, the Air Force is also concerned with timely graduation; trainees assigned to Medical Hold or Get Fit who return to training typically graduate late, which delays advanced training and affects operational units.

Intervention

In this quasi-randomized community intervention trial, we embedded two certified athletic trainers in one training squadron from January 2016 through December 2019. A board certified sports medicine physician provided medical oversight and early intervention at a central sports medicine clinic hub for trainees who were assigned to the intervention squadron and were referred by the athletic trainers for elevated care. Thus, the intervention consisted of access to embedded athletic trainers and to early referral and intervention by a sports medicine physician at a central sports medicine hub if needed. The intervention squadron was selected randomly and approved by training leadership. The remaining two squadrons served as controls by receiving usual medical care at the primary care clinic, which did not include athletic trainers or access to the sports medicine provider. All remaining policy overseeing trainees and subsequent injury/illness reporting was held constant between the intervention and control squadrons; training policies that changed during the 3-year period were applied across all squadrons, irrespective of this

intervention.

Located on the ground floor of the squadron dormitory and just inside from the fitness complex, the athletic training clinic provided convenient access to trainees. The clinic, at approximately 30x30 feet, contained the following equipment: a gait-analysis treadmill, a non-motorized manual treadmill, exam tables, freezer, resistance bands, foam rollers, and two workstations for documenting encounters in the Armed Forces Health Longitudinal Technology Application, the outpatient electronic health record of the Military Health System.

The clinic was staffed by full-time, certified athletic trainers who had bachelor degrees from an accredited program by the Commission on Accreditation of Athletic Training Education and who had passed the board of certification exam. They were credentialed by the local military treatment facility to provide care within their scope of practice, as outlined in 16 Texas Administrative Code, Chapter 110. Two athletic training faculty members from a nearby university provided part-time supplemental staffing and study support. A board-certified sports medicine physician co-signed all clinical notes, provided consultative service, and evaluated more challenging cases in the sports medicine clinic.

In addition to providing outpatient care, the athletic trainers were present for daily physical training sessions. During these periods, athletic trainers led alternative exercise regimens for injured trainees who could not participate with their peers. These alternative regimens included stationary bike riding, core strength training, stretching, and rehabilitative work. Athletic trainers also taught running form and technique to trainees and instructors, and they gave individualized gait training to select trainees who were especially slow runners or who had gait-related injuries.

Outcomes

Operational, medical, and fiscal outcomes in the intervention squadron were compared with those in the two control squadrons over the 3-year period. The primary operational outcome of interest for this study was to identify the percentage of trainees separated due to a musculoskeletal injury, referred to henceforth as "musculoskeletal attrition." Secondary operational outcomes included overall attrition, medical attrition, mental health attrition, on-time graduation, assignment to Medical Hold and Get Fit, final fitness assessment performance (i.e., total score out of 100 points, count of push-up and sit-up completion in one minute, and time for 1.5-mile run), and missed training time for specialty clinic encounters (i.e., orthopedic surgery and physical therapy).

Medical outcomes included rates of lower extremity injuries, lower extremity stress fractures, and rates of specialty clinic encounters. An injury was defined as receiving an *International Classification of Diseases, Tenth Revision* (ICD-10) code in any diagnostic position during an outpatient medical encounter. For calculation of incident injuries, trainees would only receive one diagnosis per matrix cell during the training period. Specialty clinic encounters were limited to one per trainee per day. Injury and specialty clinic encounter rates were calculated as counts divided by training days—defined as the days between entering and departing basic training, whether due to graduation or separation.

Fiscal outcomes were stratified as operational and medical. Cost of attrition was calculated as sum of recruitment costs to in-process, ship to training site, and equip ($25,376 per trainee) and daily cost to train ($490 per day). Missed training time was defined as the discrepancy between the total days in training and the days required to complete training. The medical cost was calculated as the sum cost of outpatient orthopedic ($1,347) and physical therapy ($84) encounters (V.D. Welchel, chief of resource management, written communication,

February 2018).

Data Sources and Statistical Analysis

Squadron assignment, age, sex, self-reported race/ethnicity, body mass index, fitness scores, and operational outcomes (i.e., on-time graduation, delayed graduation, attrition, and assignment to Medical Hold and Get Fit) were retrieved from the Basic Training Management System. Detailed attrition information was retrieved from the Trainee Health Surveillance attrition database, and injury codes were retrieved from the Armed Forces Health Longitudinal Technology Application. Although trainees were randomly assigned to the intervention and control squadrons irrespective of their demographic, anthropometric, and fitness profiles, the intervention and control squadron populations were compared for baseline similarity. Attrition and other binary outcomes between the two arms were assessed with a χ^2 test, while differences in age, body mass index, and fitness scores were assessed with unpaired *t* tests. All analyses were performed using OpenEpi software (version 3.01; Atlanta Georgia). Two-sided *P* values <0.05 were considered statistically significant.

Funding and Subject Protection

The study was funded exclusively through a grant from the Congressionally Directed Medical Research Programs (CDMRP) award DM140461. The study was characterized as a program evaluation by the 59th Medical Wing Institutional Review Board, with concurrence by the Human Research Protection Office of the U.S. Army Medical Research and Materiel Command, obviating the requirement of signed informed consent. Program evaluation oversight was provided by the commander for the U.S. Air Force Basic Military Training, to whom the investigators delivered quarterly updates. Trainees assigned to the intervention squadron were provided oral and written notification of the athletic trainer clinic and were entitled to all patient protections under the Patients' Bill of Rights, including right to refuse care.

4.0 MAJOR EVENTS/MILESTONES/SUCCESS

- IRB approval – 12/15
- CRADA approval – 5/15
- Cooperative agreement awarded to UIW – 9/15
- Purchase equipment/supplies; hire and educate athletic trainers; develop MTF oversight – 9/15
- Integration of athletic trainers into two training squadrons – 9/15
- Track trainee injury rates, recycling, attrition, fitness scores – (1/16 – 12/18)
- Abstract accepted for podium presentation at MHSRS – 8/19
- The greatest success of the project to date has been to provide real, actionable data for AETC/CC to direct the implementation and integration of athletic trainers with sports medicine support in every training squadron in USAF basic training. This integration of ATCs is in progress.
- Anticipate full expansion of this ATC program to be complete within the next 12 months.

5.0 RISK ASSESSMENT

Risk Analysis

Risk of harm to study participants imposed by the intervention was negligible. The greatest risk was administrative: the potential for seeking out and diagnosing MSK injury such as

a stress fracture in someone who, otherwise, may have not been diagnosed and which could have had the potential of disqualifying the trainee from further military service. However, the alternative was allowing the trainee to continue to train on an undiagnosed and unrecognized injury, increasing potential physical risk of serious medical complications. The medical care provided by the ATCs was overseen by a board certified sports medicine physician and doctoral-level athletic trainers from a supporting institution, the University of the Incarnate Word (UIW). Oversight of quality of care was under jurisdiction of 559th Medical Group chief of medical staff.

Technical Challenges

Technical challenges included those related to establishing a medical space within the athletic training complex, with all attending medical/infection control standard requirements, and medical systems requirements for charting. In addition, integrating alternative physical training and therapy for those on medical profile during standard physical training time, and fully utilizing gate training lab required a period of trial and error until processes were fully developed and optimized.

6.0 TRANSITION PLAN

Military Relevance

Identifying and characterizing the major reason for medical attrition from basic training has direct relevance to the overall mission of the Air Force and all other services under the Department of Defense. Once Air Education and Training Command became aware of this project, leadership followed closely. Interim results were briefed to the AETC commander who, after an independent business case analysis confirming fiscal benefits, directed a Program Objective Memorandum (POM)) allocating resources to fully fund the implementation and integration of ATCs to all BMT basic training squadrons.

Transition Strategy

After a directive for POM funding to expand the project to all training squadrons by AETC/CC, training leadership established a team lead to direct implementation. The initial phase was to expand other existing contracts to provide at least one ATC in each squadron while contracting officers work on funding and contracting requirements for a full expansion. Additionally, facility management and medical leadership have continued to work on all requirements to provide physical space and equipment so support expansion.

7.0 RESULTS

Demographic and Baseline Outcomes

Over the three-year study period, there were a total of 20,810 trainees who were assigned to the intervention training squadron and 35,590 trainees assigned to the two control squadrons. Table 1 summarizes demographic and baseline characteristics of trainees within the two groups. Of those assigned to the intervention squadron 76.4% were male and 23.6% female. Of those assigned to the control squadrons, 73.5% were male and 26.5% female. This correlates with typical finding within the general population of new recruits arriving for basic training at Lackland AFB of 25% being female. The mean age of trainees assigned to the intervention was 22.3 years old (SD 3.6), and 24.3 years old in the control group. The mean initial fitness score within the intervention group was 72.6 out of 100 (SD 23.6), and the mean initial fitness score within the control group was slightly worse at 68.8 (SD 24.3). At entry to basic training, the

mean BMI of trainees assigned to the intervention was 23.9 (SD 3.8), and 24 (SD 2.8) in the controls.

Operational Outcomes

Table 2 summarizes operational outcomes. Compared to controls, intervention group had 15% less overall attrition over the course of the study period (RR 0.85, 95% CI 0.7988, 0.9131). Musculoskeletal attrition was 25% lower in the intervention squadron compared to controls (RR 0.75, 95% CI 0.6353, 0.8881). There was a 20% decrease in attrition for any medical reason compared to controls (RR 0.80, 95% CI 0.7164, 0.9021). There was no statistically significant difference in mental health attrition between the two groups. Interestingly, there was an improvement in attrition for administrative reasons by 27% in the intervention group compared to controls (RR 0.73, 95% CI 0.62, 0.8669).

Final fitness scores improved in the intervention group by 19.7 points and in the controls by 11.8 points (p value << 0.05). The difference in means between the two was 7.84 (95% CI 7.337, 8.343). Pulling trainees out of training into a medical hold status (medical holdover referral) decreased by 16% in the intervention group compared to controls (RR 0.84, 95% CI 0.7892, 0.9024). There was no statistically significant difference in Get Fit referrals. The difference in on-time graduation was negligible.

Medical Outcomes

Table 3 summarizes medical outcomes. The number of encounters with a medical provider for any diagnosis falling in the category of "inflammation and pain" increased in the intervention group by 46% (RR 1.46, 95% CI 1.414, 1.503). The number of encounters for lower extremity injuries decreased by 8% in the intervention group (RR 0.92, 95% CI 0.9016, 0.9451), whereas the actual incidence of lower extremity injury increased by 11% in the intervention group compared to the control group. Stress fracture incidence decreased by 16% (RR 0.84, 95% CI 0.7344, 0.9702) in the intervention squadron. Similarly, the number of encounters for stress fractures decreased by 43% (RR 0.57, 95% CI 0.5466, 0.5897).

Rates of orthopedic, occupational therapy and physical therapy (OT/PT) encounters were calculated as a quantification of specialty care given. The rate of orthopedic encounters in the intervention squadron was 57% less than controls over the study period (RR 0.43, 95% CI 0.3441, 0.5437). The rate of OT/PT encounters was 65% less than controls (RR 0.35, 95% CI 0.3316, 0.3639). The overall rate of MSK encounters (including all encounters by specialists, ATs, sports medicine providers, and general providers in the Reid Clinic) was 6% less in the intervention squadron than in control squadrons.

Fiscal Outcomes

Overall cost avoidance achieved was calculated by determining expected number of encounters and expected attrition based on numbers observed in control squadrons, multiplied by a ratio of person-time between the intervention and control group. Standard costs per encounter were obtained by the 59 Medical Wing Group Practice Manager's estimates of costs per encounter. Cost avoidance due to savings in attrition were calculated based on estimate of costs of recruiting, shipping to basic training, and provision of initial clothing and equipment, plus the estimated daily cost to train. Over the three-year study period, compared to controls, in the intervention squadron there were 119 orthopedic encounters saved and 3,988 OT/PT encounters saved. There were estimated 11,926 hours saved, 65 MSK attritions saved, and 207 saved from all attrition. Cost avoidance for orthopedic and OT/PT encounters saved totaled $495,823. Cost avoidance from saved MSK attrition was $6,259,326. Cost avoidance from saved attrition from

all causes totaled $10,888,056.

8.0 DISCUSSION

This study evaluated the impact of embedding ATCs with sports medicine physician support within the training squadron and comparing outcomes against two control training squadrons who received standard medical care at the primary care clinic. By implementing this intervention, significant improvements in outcomes measured and noted. With a 25% reduction in MSK attrition, a 15% reduction in overall attrition, and an associated $10.9 million of cost-avoidance, the operational impact of preserving the efforts associated with recruiting, in-processing, and training military personnel validates that athletic trainers are an effective, additive component to the sports medicine team when applied to military medicine and integrated closely in an operational unit.

When following a sports medicine model of care where the athletic training facility functions within the physical space of on-going training activities, the proximity of the ATCs within the training complex and the active integration with training leadership to coordinate patient care is reduced for the threshold of trainees seeking assistance. Unsurprisingly, this resulted in higher total numbers of MSK encounters in the intervention squadron. The embedded ATCs experienced a 46% increase in encounters for those in the inflammation and pain diagnostic category. Similarly, the intervention squadron had an 11% increase in lower extremity injury diagnoses. However, this lowered threshold to seek care also prompted timely interventions, which helps to explain the 16% reduction in stress fracture development and decreased attrition due to MSK injury. Although there were more encounters in the intervention squadron, there was also greater rehabilitation and return to training resulting in graduation.

A concern for training leadership is assessing the quality of those trainees who do graduate who otherwise would not have and what their impact would beon force readiness. By saving a trainee from discharge due to MSK injury through rehabilitation, there might be a reflective negative effect on downstream fitness. Physical fitness training outcomes from this study might suggest the opposite, at least in the timeframe of basic training. Although the intervention squadron presented with higher entering fitness scores, in total, they left with significantly greater improvement percentages (19.7 v 11.8; $p<0.05$). Null findings would have likely yielded results in the opposite direction (less fit group has higher improvement potential; rapid initial gains in fitness slow as fitness improves). Those unprepared to advance would have had reduced average fitness training scores. These study results show the opposite is true further supporting the effectiveness of embedding athletic trainers within sports medicine teams to provide earlier access to medical care within basic military training squadrons.

Limitations

The presence of ATCs provides a unique perspective in care by blending high-quality patient care with the training and mindset of prevention. After 36 months, little can be done to specifically isolate which facets of ATC integration created the best outcomes nor can the current data set provide insight into which interventions should be used within other squadrons.

Additionally medical system limitations prevented the distinction between encounters seen by ATCs and encounters seen at the primary care clinic. The costs of care by ATCs vs. primary care providers cannot be distinguished. Future data analysis will be needed to further explore this cost of care differences.

Finally, there were missing BMI and fitness data which could not be recovered. These data could introduce bias in the comparison of fitness scores and BMI between intervention and

control groups. However, primary operational, medical, and fiscal outcomes were not impacted by the missing data, as all these outcome data were present even if certain individuals were missing initial fitness or BMI.

Future Research

Nye, et al. (2016) reported that MSK injuries accounted for approximately 25% of all-cause attrition.(1) The current intervention demonstrated a 25% reduction in MSK attrition. Therefore, if the reduction in all cause attrition were due solely to the decrease in MSK proportion, we would have expected a 6% reduction (in all cause). Instead, we measured a 15% reduction. There seems to be a synergistic effect between improving the MSK care within the training squadron and other factors that influence attrition for other causes. As the USAF pursues focused collaborative care teams specific for a squadron's needs, understanding this synergy may augment the effect of the integrated operational support endeavor. Certainly further investigation into how improving MSK care can impact other facets of training is warranted.

Adding any new component to a functioning system, such as athletic trainers within healthcare teams, and integrating them into a training squadron should be done with great intention and careful oversight. The needs in USAF basic military training carry unique requirements compared to sister service basic training and compared to other technical training schools within the USAF. More broadly, every military group presents with unique challenges to their operational goals of readiness for deployment. For any individual operational unit seeking to integrate medical elements such as ATCs to further its' aims and mission, continuous process improvement must also be integrated in order to rapidly develop best practices and optimize outcomes. Surveillance and epidemiologic data must also be leveraged to define appropriate targets of intervention. Whereas ankle sprains account for the single greatest acute injury in USAF BMT, the impact and volume of stress fractures (overuse injuries) significantly outweighs their relevance. Future research should further track the impacts of focused interventions by the healthcare team to discern effect and optimize patient outcomes.

A final critical need for a future study would be to evaluate long-term outcomes during first term enlistment after graduation from BMT for those who were exposed to the intervention of having integrated ATCs in their training squadron. This will help answer the question of whether or not rehabilitating MSK injury in BMT and graduating the airmen would lead to higher rates of a disqualifying injury further in their careers.

Readiness to complete the required mission is critical to USAF success and ultimately to US national security. The athletic trainer approach to keeping athletes in the game functions well when adapted to USAF BMT. This study shows that it contributes to USAF readiness by avoiding unnecessary attrition, improving fitness, and ultimately graduating more airmen to carry on the critical mission tasked to the USAF. These operational, medical and fiscal impacts warrant continued effort to ensure full implementation of integration of ATCs throughout all BMT training squadrons.

9.0 DELIVERABLES

9.1 Presentations

Military Health System Research Symposium 2016 - Military Athletic Trainer Integration in US Air Force Basic Training

National Athletic Trainer Association annual meeting 2017 - Athletic Trainer Integration within US Air Force Basic Training

USAF Senior Leadership Workshop 2018 – Athletic Trainer Integration in US Air Force Basic Training

Southwest Athletic Trainer Association 2018 - Athletic Trainer Integration within US Air Force Basic Training

National Athletic Trainer Association annual meeting 2018 - In search of true value: Calculating your worth with legitimate math

University of the Incarnate Word Research Week 2018 - Athletic Trainer integration within US Air Force Basic Training

National Athletic Training Association webinar 2019 - In search of true value: Calculating your worth with legitimate math

IOS meeting 2019 - Athletic Trainer integration within US Air Force Basic Training

Military Health System Research Symposium 2019 - Athletic Trainer Integration within US Air Force Basic Training

Submitted for NATA 2020 - Impact of ATs on Prevention and Care of Injuries During United States Military Training: What Are We Worth?
Joint session with Dr. Dan Clifton at Uniformed Services University

10.0 COST

Total funds awarded from CDMRP were $979,874. This broke down per year as follows: Year one was $388,676, year two was $310,074, and year three was $281,124. Estimated costs for supplies were $105,000, and for equipment $55,000.

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12.0 APPENDIX

12.1 Tables

Table 1. Demographic and baseline characteristics of intervention and control squadrons

	Intervention	Controls	P value
n	20,810	35,590	-
Male (%)	15897 (76.4)	26,165 (73.5)	<0.0000001
Female (%)	4,913 (23.6)	9,425 (26.5)	<0.0000001
Mean age (SD)	22.3 (3.6)	22.4 (3.6)	0.001458
Mean initial fitness score (SD)	72.6 (23.6)	68.8 (24.3)	<0.0000001
Mean BMI[a] (SD)	23.9 (3.8)	24 (2.8)	0.0003506

[a] Body Mass Index

Table 2. Operational outcomes, intervention vs. control squadrons

	Intervention	Control	Risk Ratio	95% CI
Overall Attrition (%)	5.81	6.81	0.85	(0.7988, 0.9131)
MSK[a] attrition (%)	0.94	1.25	0.75	(0.6353, 0.8881)
MH[b] attrition (%)	2.92	2.97	0.98	(0.8902, 1.084)
Any medical attrition (%)	2.00	2.49	0.80	(0.7164, 0.9021)
Admin attrition (%)	1.028	1.031	0.73	(0.62, 0.8669)
Med Hold[c] referral (%)	5.76	6.83	0.84	(0.7892, 0.9024)
Get Fit referral (%)	1.18	1.26	0.94	(0.8029, 1.094)
On-time graduation (%)	93.16	92.68	1.005	(1.001, 1.01)
Change in fitness score[d]	19.70	11.86	7.84[e]	(7.337, 8.343)

[a] Musculoskeletal

[b] Mental Health

[c] Medical Holdover

[d] P < 0.0000001

[e] Mean difference

Table 3. Medical outcomes, intervention vs. control squadrons

	Intervention	Control	Rate Ratio	95% CI
Rate[a] of encounters for inflammation and pain	6.1	4.2	1.46	(1.414, 1.503)
Rate of encounters for lower extremity injury	8.7	9.4	0.92	(0.9016, 0.9451)
Incidence[a] of lower extremity injury	1.9	1.7	1.11	(1.052, 1.169)
Rate of stress fracture encounters	2.9	5.1	0.57	(0.5466, 0.5897)
Incidence of stress fractures	0.2	0.3	0.84	(0.7344, 0.9702)
Rate of orthopedic encounters	0.08	0.17	0.43	(0.3441, 0.5437)
Rate of OT/PT[b] encounters	1.8	5.1	0.35	(0.3316, 0.3639)
Rate of all MSK[c] encounters	9.3	9.9	0.94	(0.9153, 0.958)

[a] All rates/incidences are per 1000 trainee days

[b] Occupational Therapy/Physical Therapy

[c] Musculoskeletal

12.2 List of Symbols, Abbreviations and Acronyms

AETC – Air Education and Training Command
ATC – Certified Athletic Trainer
BMT – Basic Military Trainee or Basic Military Training
IRB – Institutional Review Board
MAT – Musculoskeletal Action Team
MHSRS – Military Health System Research Symposium
MSK – Musculoskeletal
MTF – Medical Treatment Facility
OT/PT – Occupational Therapy/Physical Therapy
SD – Standard Deviation
RR – Rate Ratio or Risk Ratio
UIW – University of the Incarnate Word
USAF – United States Air Force