VETERINARY MEDICINE

An Ongoing Series

Special Forces Medical Sergeant/Special Operations Independent Duty Corpsman Candidates

Large Animal Module

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ABSTRACT

Background: Medical care provided by Special Operations Forces (SOF) combat medics is vital for establishing communication with local populations. In many of these communities, livestock hold a valuable position within the social, political, and cultural structure. The West Virginia University (WVU) Special Forces Medical Sergeant/Special Operations Independent Duty Corpsman (SFMS/SOIDC) Large Animal Module is designed to provide a foundational experience in livestock husbandry and veterinary procedures to SOF combat medic candidates. This study was conducted to determine the participants' base knowledge of food animal production and to evaluate if the program content was sufficient for increasing their knowledge of the subject matter. **Methods:** A quasi-experimental design utilizing pre-test and post-test instruments was used. The validity of the testing instruments was established by a panel of subject matter experts and the instruments' reliability was determined by a split-half analysis using SPSS® statistical software. The difference between the pre-test and post-test examinations were compared for 66 candidates who were assigned to WVU Health Sciences Center for the applied medical experience program and 46 counterparts assigned to other institutions by a match pair analysis. **Results:** Seventy-five percent of the subjects had no previous livestock exposure, and only 7% had previously participated in the 4-H program or Future Farmers of America (FFA). The average improvement in scores, pre-test versus post-test, was significantly greater for those that attended the module (18.5 versus 0.9). **Conclusion:** Few SFMS/SOIDC candidates have prior knowledge of livestock husbandry practices. The large animal module successfully provides education on livestock husbandry practice to participants. Knowledge of livestock production can assist SOF medics in establishing rapport with indigenous populations while on mission.

KEYWORDS: *livestock; husbandry; program evaluation; SFMS; SOIDC; Special Operations; animal; veterinary*

Introduction

The US Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS) at Fort Bragg, North Carolina is the training/selection site for SOF combat medics from all branches of the US military. The amount of training received at the school varies depending on the branch of service. The programs offered at the school can be segmented into two main programs. The first Special Operations Combat Medics (SOCM) course spans 36 weeks of basic combat trauma training. This training includes anatomy and physiology, pharmacology, trauma patient assessment, trauma surgical skills, combat trauma management, Tactical Combat Casualty Care, prolonged field care, and emergency medical technician-paramedic (EMT-P) courses. The second phase of the program is the 16-week Special Forces Medical Sergeant Course. This course provides surgery and anesthesia, ultrasound, and laboratory and veterinary medicine programming.

Once deployed, the medics are expected to maintain a high level of physical preparedness and are continuously training and conducting operational exercises. SOF combat medics may be utilized in a variety of missions. These missions include civil affairs, combatting terrorism, direct action, foreign internal defense, humanitarian assistance, and operations other than war. When not actively involved in preparing or conducting a mission, the medics are responsible for force health protection.[1,2] In deployment situations, they are trained to provide medical care independent of specialists. It is advantageous

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for Special Forces Operators to utilize their skills to develop rapport with indigenous populations they encounter while on mission. Establishment of open, trustworthy lines of communication are essential to ensuring the safety of the SOF team and increase the likelihood of a successful mission outcome. The medical components of these teams are best suited to fulfill this role. Although their training is focused on ensuring the well-being of their team, their skills are transferable to providing medical assistance to local populations.

West Virginia University Health Sciences Center (WVU-HSC) hosts small groups of SFMS/SOIDC candidates for a 4-week applied medical experience program. While at WVU-HSC, the candidates rotate through various departments practicing skills acquired throughout their training. Following completion of their program, and acceptance as an active Special Operations combat medic, the servicemen will function as the medical component of small Special Operations teams around the globe. Although WVU is one of many locations that provide the applied experience opportunity, it is the only institution that is currently providing additional training in animal husbandry and veterinary medicine.

In many of these communities, livestock play an essential role in the social, political, and cultural fabric of their lives. The medical care provided to the local population is deemed critical to "gaining the hearts and minds" of indigenous peoples.[3] Penner points out that, "In regions where livestock represent nearly the entire economy for a family or an entire tribe, veterinary care is a highly effective means to gain access to an area."[4] While the training of SFMS and SOIDC candidates does incorporate a veterinary component, it is centered on canine and equine care. A decrease in the US rural population, and a subsequent decrease in the number of people engaged in agriculture production, has limited the possibility of future Operators having experience in food animal production.

Purpose and Research Questions

The WVU Large Animal Module provides the participants with foundational education involving animal handling, husbandry, and veterinary medicine. Hughes and Hughes recommended that predeployment veterinary training may "prove critical to the advancement of combat medic in-theater skill sets."[3] It is assumed that, with the high skill level of Special Forces combat medics, a basic livestock program (animal behavior, animal husbandry practices, and veterinary skills) that easily relates to human medical principles will provide valuable skills for these soldiers. These skills can help develop rapport with indigenous populations.

The educational objectives for the module are:
1. To provide foundational understanding of the relationship between animal instincts and observed behaviors,
2. Introduce participants to unfamiliar livestock species,
3. Develop skills to effectively move livestock,
4. Provide understanding of common livestock husbandry practices, and
5. Establish a link between human medical training and veterinary practices.

The study questions we seek to answer are:
1. What base knowledge, concerning livestock handling and husbandry, do SFMS/SOIDC candidates possess?
2. Although some veterinary medical topics are covered during their previous training, would a more in-depth program be of benefit to SFMS/SOIDC medics?

Methodology

Module Activities

The 10-hour educational module is conducted over a 1.5-day period at WVU Reymann Memorial Farms. A 1-hour lecture to discuss animal behavior and the concept of low-stress animal handling begins the program. Key points covered in low-stress handling include: factors that contribute to a fear response in livestock, the physiological characteristics of how animals see and hear, utilization of an animal's flight zone and point of balance in herding practices, recognition of animal temperament, handler behavior and movement during the herding process, and the use of driving aids when herding livestock. A second presentation, discussing dystocia (birthing difficulties), covers monitoring the birthing process, factors contributing to dystocia, and methods for correcting malpresentation in the different livestock species.

The remainder of the program offers a variety of hands-on activities with beef cattle, poultry, sheep, and swine. Groups are rotated through stations for each species, and a similar informational format is used at each station. Each station covers prominent behavioral characteristics, production cycles, common husbandry practices, physical restraint, and the diagnosis and treatment of common adverse health conditions. Specifically, the activities included: use of a hog board and snare for restraining swine, flipping sheep and hoof trimming, rectal palpation of beef cattle, casting large livestock, proper restraint of poultry, techniques and anatomical locations for collecting blood samples, body weight estimation, body condition scoring, and procedures for health examinations. Veterinary staff lead a discussion with the group on antibiotic selection and formulary differences between human and veterinary medical pharmaceuticals. The final activity allowed the participants to demonstrate their understanding of herding principles. Each participant was placed in a pen of yearling bulls and asked to separate one member from the herd and hold him at the opposite end of the pen. All animal activities were approved by the WVU Institutional Animal Care and Use Committee (protocol #1604002146).

Data Collection and Analysis

To answer our evaluation questions, a quasi-experimental design utilizing pre-test and post-test instruments was used.[5] In nonrandomized designs, selection bias is a realistic threat to internal validity. For this study, the rigorous selection and training process of the experimental and control group members, along with the administration of the same pre-test instrument, establish uniformity of the groups. The pre-test and post-tests were constructed by the researcher to target expected knowledge gain from completion of the 1.5-day program. The pre-test utilized both multiple choice and short-answer questions. The post-test asked the same questions as the pre-test and included demographic questions related to the attendee. Validity of the instruments was established through review of the materials by the members of the educational team that presented the course content. Reliability of the testing instruments were determined by a split-half analysis using SPSS version 25 (IBM; www.ibm.com/products/spss-statistics). The inter-item correlation for the pre-test produced a Spearman-Brown

Coefficient of 0.762 and the post-test coefficient was 0.946. The instruments' standard of reliability can be interpreted as exemplary.[6] Approval for participant evaluation was provided by the WVU IRB (IRB Protocol #1801950697).

Candidates are assigned to institutions for the applied medical experience program by JFK leadership. Those that are assigned to WVU are considered the treatment group and those assigned to other locations serve as the control. For this evaluation, the research team was allowed contact to those that received training at other institutions through JFK leadership. The evaluation instruments were provided to both groups using the online platform Qualtrics™ (Qualtrics™ XM, www.qualtrics.com). Qualtrics allows for deidentified data, and access is limited to the developer and/or their designee(s). Links to the Qualtrics pre-test, a cover letter, and all supporting documentation were sent via email to JFK Training Center Command, who forwarded the message to both participant groups 1 week prior to conducting the training. Only those tests that were completed prior to initiation of the program were included in the data set. Immediately following the program, a second message was forwarded from the JFK Training Center Command to both groups containing the post-test link, cover letter, and supporting documentation. The participants had 1 week from the email being sent to complete the evaluation. Only those received prior to the deadline were considered for analysis.

The pre-test and post-test were scored following the completion of the post-test. All tests were scored by the same individual and completed within 1 day. The scoring was based on the number of correct responses. Individual results were entered into an Excel® (Microsoft®; www.microsoft.com/en-us/microsoft-365/excel) spreadsheet and imported in JMP® Statistical Discovery™ software (SAS®; www.jmp.com/en_us/home.html) for further analysis. Demographic data were analyzed to report frequencies, and pre-test/post-test score differences were analyzed using the match pairs function of JMP version 14. Significance was determined at $\alpha = .05$, set a priori.

Results and Discussion

Eleven of the classes that attended training at WVU were used in the dataset. These groups provided 66 participants. The control groups came from two classes and provided 46 participants that were assigned to other institutions. The demographic breakdown for all subjects is provided in Table 1. The US military attracts servicemen from all backgrounds. We asked the participants to classify their hometown by size. Their choices were large city/metropolitan area (21 %), suburban (25%), small town (23%), or rural town (30%). Even though the largest percent came from a rural community, few of the participants had previous exposure to livestock species. Sixty-six percent (n = 44) of the treatment group had no previous exposure to food animal species and 86% (n = 40) of the control group indicated no previous experience. Of those that had previous livestock experience, much of that exposure was with horses (treatment = 16, control = 4). The lack of previous livestock experience is also reflected by participants having been involved with 4-H and/or FFA programs in their youth. Ninety-two percent of the treatment group (n = 61) and 97% (n = 8) of the control group had never participated in a 4-H and/or FFA program.

There has been minimal research to assess the general public's knowledge of agricultural practices. A 1993 pilot study by Birkenholz et al. assessed the agricultural literacy of 2005 adults and teenagers in Illinois, Michigan, and Missouri.[7] Agricultural literacy was gauged on knowledge of: the significance of agriculture in America, agriculture policy, how agriculture related to natural resources, basis agricultural production practices for plants and animals, processing of agricultural goods, and marketing and distribution of commodities. Although the author acknowledged that the small sample size made it impossible to make an inference to the entire US population, he did offer generalization that supports the premise. Adults had a greater agricultural literacy than the youth. Literacy was higher for rural residents compared to urban residents, and small-town residents had a greater literacy over their large city counterparts. Similar results were seen in a 2013 study of elementary students in Houston, Texas.[8] Thirty percent of the students claimed to have no knowledge of agriculture.

TABLE 1 *Participant Demographics*

	N	%
Hometown Size		
Large city/metro	24	21
Suburban	28	25
Small town	26	23
Rural	34	30
Previous Livestock Experience		
None	84	75
Cattle	12	11
Equine	20	18
Poultry	15	13
Sheep/goats	5	4
Swine	6	5
	Yes	**No**
Youth Livestock Participation		
4-H/FFA	9	103

FFA = Future Farmers of America.

There were 46 possible correct responses on the testing instruments used for this evaluation. There was no significant difference for pre-test scores between those that had attended the training (17.2 correct responses) and the control group (13.8 correct responses) (Table 2). Some base knowledge was expected, in that the medical training program at JFK utilizes live tissue models. All participants, having advanced to the applied clinical experience, had acquired previous knowledge of average body temperatures and locations for collection of blood samples for the different species. They were also able to deduce, through common sense, some situations in which an animal may behave abnormally. These would be instances in which an animal is sick or injured.

There was a significant difference in change from pre-test to post-test scores for those that had completed the livestock module at WVU (treatment = + 18.5 versus control = + 0.9, $p < 0.0001$). The treatment group averaged 35.7 correct responses on the post-test, while there was a negligible increase in the number of correct responses for the control group (average = 14.7). Those participants that were able to attend the training were able to understand the observed behaviors of livestock and temperaments associated with the behaviors. They were able to describe how to properly herd the different livestock species and methods to safely restrain livestock for either diagnosis or performance of a veterinary health procedure.

TABLE 2 *Pre-Test Versus Post-Test Results*

Group	N	Pre-Test	Post-Test	Difference
1	6	20.3	38.5	+ 18.2*
2	6	17.5	35.8	+ 18.3*
3	6	18.8	35.6	+ 16.8*
4	6	15.2	35.2	+ 20.0*
5	6	13.5	35.5	+ 22.0*
6	8	18.5	36.9	+ 18.4*
7	6	13.8	36.8	+ 23.0*
8	6	15.0	36.5	+ 21.5*
9	6	18.0	43.2	+ 25.2*
10	6	18.3	34.3	+ 16.0*
Control	34	17.9	19.1	+ 1.2
11	4	22	33.3	+ 11.3*
Control	12	15.7	11.9	– 3.8
Treatment average	66	17.2	35.7	+ 18.5*
Control average	46	13.8	14.7	+ 0.9

*Significant at $\alpha = .05$, $p < .0001$.

Conclusions

For the majority of those that participated, this was their most significant interaction with livestock. While the Special Operations Civil Affairs Medical Sergeant (SOCAMS) course at the USAJFKSWCS includes significant exposure to livestock, the SFMS course provides only a basic introduction to livestock and the ability to provide basic care of limited livestock species. It cannot be overstated that the primary role of the combat medic is to insure the wellbeing of US military personnel and their assets. Human health will always take the priority over animals. During Operation Enduring Freedom, of all the service provided by combat medics, only 0.4% was procedures on livestock.[3] The type of mission will dictate the resources made available. In purely humanitarian efforts, the medics may be accompanied by subject matter experts (veterinarians, physicians, agronomist, etc.) to provide care and education to the local population, but this is not the norm.[9]

Observation of the participants during the module indicated the start of a learning process. The veterinary medicine component was quickly grasped by the medics. The physiological similarity of human and other mammals allowed the participants to translate their knowledge of human medical practices to veterinary procedures. However, it was the experiences of restraining and herding the different species that may prove most valuable to these medics once deployed. They have begun to gain competencies that will allow them an additional avenue to foster relationships. Kristjanson states that, "Livestock are seen within the greater context of peoples' livelihood strategies, accounting for the fact that the resource-poor have more pressing concerns than raising the productivity of their livestock enterprise."[10] He goes on to explain that livestock are more than just a source of food, but provide valuable manure for fertilizer, draught power for everyday chores, and help maintain social capital and status within a community. Efforts to improve the productivity of livestock production, which ignore the social ramifications, have the potential to disrupt normal life in these communities.[11] Subsidized agriculture may be in norm in developed societies, but low-income producers prioritize food security and a desire to maintain their lifestyles.[12]

This evaluation only focused on the acquisition of knowledge from participation in the program. Instructors were able to observe the medics apply this knowledge to successfully herd the different species. The future application of these skills has not been evaluated. The participants have not been followed into active duty to determine if they have been able to apply those skills in a real-life situation. There has been anecdotal evidence that opportunities have arisen in post-module training exercises in which the participants have been able to apply the training.

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Author Contributions

JKY, JY, and MW conceived the study concept. JKY developed the testing instruments, collected/analyzed the data, and wrote the first draft. JKY, JY, BS, DW, and DM all provide content for the educational module. MW and AW coordinate facilities and program participants. All authors read and approved the final manuscript.

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