

THERAPY DOGS AS A PREVENTIVE MEASURE FOR RABIES EXPOSURE AND
MENTAL HEALTH ISSUES IN DEPLOYED TROOPS

by

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Abstract

I have been fortunate to gain an invaluable experience while completing my Masters of Public Health at the Fort Riley Military base. Under the direction of Dr. Paul Benne and many of his support staff I have learned many aspects and functionality of the day-to-day operations of a public health department. My general idea going into this experience was to learn more about mental health of military staff in the deployed environment and incorporating animal therapy programs into daily operations that would aide in the reduction of mental health related events. By interacting with animals in the deployed environment, the risk of rabies is of great concern for the safety of soldiers. Sadly, in the past the military has experienced a few cases of rabies transmission in active duty soldiers that have been exposed to infected animals. Incorporating animal therapy programs into a deployed environment would provide an alternative to soldiers seeking companionship from local dogs that have a high probability of being infected with Rabies.

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Introduction:

I was extremely fortunate to be able to go through my field experience with the Fort Riley Public Health Department. My hypothesis going into this experience was “Therapy dogs should be included with deployed troops and would reduce the number of mental health issues in these troops and would also help prevent troops from Rabies exposures from local infected dogs.” I feel the evidence is clear that this hypothesis is valid and should be tested further by adding Animal Assisted Therapy and Animal Assisted Activity programs to the deployed environment.

Chapter 1: Field Experience

Fort Riley Public Health Department

History of Fort Riley

United States Army’s Fort Riley Military Post is located in Northeast Kansas between Junction City and Manhattan Kansas. Fort Riley was established in 1853 in honor of Major General Bennett C. Riley. The fort’s main focus, at the time, was to protect and monitor the movement of people and trade over the Santa Fe and Oregon-California trails. Troops often were utilized as escorts on mail trains and to protect travel routes across the plains. In 1855, Congress envisioned a greater plan for the small post and began construction on additional living facilities, stables and operational facilities. During the time of construction, a cholera epidemic raged through workers and claimed 70 lives (The History of the 1st Infantry Division 2013). During World War I, Fort Riley was home to nearly 50,000 soldiers. It has been said that Fort Riley may be identified as ground zero for the Spanish Flu epidemic of 1918.

In 2010, Fort Riley housed approximately 7,761 people but the population dramatically increased during the daytime due to commuters. It is estimated that 64% of the population is male and 36% female. Fort Riley is also very diverse; 65.4% of the population is white not Hispanic, 15.9% black, 12.3% Hispanic and 6.4% consist of other ethnic groups (U.S. Department of Commerce 2013).

Irwin Army Community Hospital

The first hospital facility at Fort Riley was first completed in 1855 as a simple limestone building with a small porch (The History of the 1st Infantry Division 2013). Although the hospital itself has undergone many changes, the main objective and mission is to provide the best possible care for the soldiers of Fort Riley and their families. Now, Irwin Army Community Hospital (IACH) is undergoing many exciting changes including a completely new facility east of the current hospital. The new IACH is projected to cost 334 million dollars and encompass 552,000 square-feet. The design of the facility will include a 263,000 square-foot inpatient community hospital, a 289,000 square-foot outpatient clinic, a central energy plant, an ambulance garage and parking for over 1,600 vehicles. This new world-class medical operation will allow IACH and Fort Riley to provide the latest technology and medical sciences to their soldiers and their families. The facility is expected to be completed in 2014 (Health Designs 2013).

Fort Riley Public Health Department

The public health department located on Fort Riley is a part of IACH under the direction of Dr. Paul D Benne MD, MPH. The public health department plays a crucial role in almost every aspect of the military base, stationed and deployed environments. They are charged with preventing epidemics and disease, monitoring and protecting against environmental hazards, assessing behavioral health, disaster response, educational programs, promotion and inspection of incoming food and handling facilities. Fort Riley Public Health has several divisions within their program: Industrial Health and Hygiene, Environmental Health, Occupational Health, and Public Health Nursing.

Occupation health (OH) is a very important and often overlooked facet of the public health department. OH is responsible for conducting hearing and spirometry testing (lung function assessment), vision screenings and immunizations. I was able to observe and participate in numerous appointments throughout my time in OH. This department is able to see many patients throughout the day and conduct baseline hearing and spirometry testing but also is responsible for monitoring any changes in their previous testing levels. Many patients are monitored regularly for hearing loss, vision conservation, and respiratory hazards in the workplace. OH has the ability to provide immunizations to soldiers and employees of the base as needed to protect themselves and others from potential hazards.

Industrial Health and Hygiene (IH) works closely with OH in the fact that they monitor the workplace environment for potential hazards and are responsible to maintain a safe workplace. IH often conducts office and workplace ergonomic evaluations, workplace noise monitoring, and environmental hazards such as mold detection and ventilation. I was able to

participate in many of the aspects of IH and go on many field calls and home visits. One visit in particular, we traveled to a house on post that had been flooded due to a water line break. We took moisture samples by probing the wall near the baseboards where the water had previously been. Fortunately, they were able to remove nearly all the moisture from the walls and floor by adding proper ventilation and sanitation after the waterline break.

Environmental health (EH) has a wide variety of duties including water collection, pest and vector management, food service sanitation and inspection, and hospital waste management. One area in which I was able to participate in often was the pest management. EH continually monitors mosquito activity and identification of species collected in traps around the base. This is very important for the safety of the staff, soldiers and their families by using vector control methods when necessary at peak times and identifying certain mosquito species that are a known vector of pathogens such as West Nile Virus. I was also able to participate in monitoring and collection of tick species, water sample collection and many monthly food service inspections. Food inspection is an ongoing task for many staff in the EH department. Housing and dining, hospital cafeterias, fast food operations and food vendors during special events are all inspected monthly and meet not only the government's requirements but also the United State Military regulations. The areas are given a simple letter grade based on the number of violations present. EH is a vital part of maintaining a healthy and functioning military base.

Public health nursing (PHN) is responsible for monitoring disease outbreaks, and controlling and preventing illness. They are also charged with the heavy task of tobacco cessation programs. Within the military there are a large number of soldiers who use numerous tobacco products during training, the work day and while deployed. It is the goal of the public health nursing group to decrease the number of tobacco users by providing helpful counseling,

goals, health monitoring and often prescription medications to aid in breaking their tobacco habit. Public Health nursing also offers consults for persons that have contracted a sexual transmitted disease, aids meeting the needs for special needs children in schools and child development centers on base, and offer guidance to prevent disease outbreaks. During the Manhattan school district enrollment in August, I was able to educate family members on the required vaccinations to attend the district school and many of the recommended vaccines for their children. Although many of the children with their parents were very unhappy with the fact they required additional vaccinations, the parents were extremely grateful for the added education.

Purpose of this Research

August 2011 a male United States soldier that was recently deployed to Afghanistan was admitted to the emergency department in New York with arm and shoulder pain, nausea, vomiting, ataxia, anxiety, and dysphagia. Rabies virus antigens were detected in the soldier by using various methods of collection and was identified as an Afghanistan canine rabies variant. The soldier reported to the emergency department that he was bitten by a dog in Afghanistan in January 2011 but did not report the incident to his superiors. Soldiers often deliberately interact with local, stray animals that may be infected with a variety of infectious diseases including rabies. Because this is not the only tragic death due to rabies exposure in a similar manner, therapy dogs embedded into the deployed environment might be a valid solution for reducing the desire to seek stray animal companionship.

Chapter 2: Rabies

Introduction

Rabies is a viral disease of mammals that is highly preventable. The word rabies comes from the Sanskrit word *rabhas*, which means “to rage.” Rabies is a viral zoonotic disease that belongs to the genus *Lyssavirus* within the family *Rhabdoviridae*. Once rabies has infected a mammal and they exhibit clinical signs, the disease is almost always fatal. Rabies ranks 11th among infectious diseases that cause the greatest number of deaths (Leung, Davies et al. 2007). A majority of rabies in the United States occurs in wild mammals such as raccoons, skunks, bats, and foxes. Most rabies related deaths occur in developing countries. The virus is transmitted

through infected saliva from a mammal to another mammal often through a bite (Rabies around the World 2011). Although uncommon, rabies can be transmitted through an open wound, scratch, abrasion, or mucous membrane that has come in contact with fresh, infected saliva. Even less uncommon, rabies can be contracted through aerosol inhalation or by organ transplants (Leung, Davies et al. 2007).

Epidemiology

It is estimated that approximately 50,000 to 100,000 human deaths occur from rabies each year globally. The actual number of deaths is likely much larger due to underreporting in developing countries that have little or no access to health care. Globally, stray dogs account for over 90% of human infections and 99% of human deaths. In developed countries bats, raccoons and skunks are major reservoirs because many of the domestic animals such as dogs, cats and ferrets are vaccinated by licensed veterinarians. It has been reported that children are 4 times more likely to be bitten than an adult and boys are bitten more often than girls (Leung, Davies et al. 2007). It is hypothesized that because boys are normally more curious and adventurous than girls, therefore placing them at a higher risk for facial bites by dogs.

Pathogenesis

The rabies virus often enters the body through a break in the skin from fresh, infected saliva from another mammal. At the site of the break in the skin, the virus will remain latent while the virus replicates within the surrounding muscle. The virus will soon begin to affect the nervous system where viral replication is rapid within the neurons. The replication within the neurons causes severe inflammation and necrosis of surrounding tissue. Upon entering the central nervous system the virus spreads throughout the peripheral nerves via the salivary glands.

This explains why bites are the number one cause of transmission because of the high concentration in the salivary glands (Leung, Davies et al. 2007).

Clinical Presentation

Rabies has an incubation period of, on average, 30 to 90 days but may be as long as several years. Shorter incubation periods are possible, especially with multiple deep lacerations and bites on the head and neck. The progression of the disease occurs in two forms, the first being the encephalic or furious form in about 80% of human patients. The second form of rabies presents as a “dumb” or paralytic form, which occurs in about 20% of patients. Characteristic clinical symptoms of the disease range from hyperexcitability, hydrophobia, aerophobia, and autonomic dysfunction such as hypersalivation, sweating, lacrimation, mydriasis and hyperpyrexia. Paralysis develops in limbs that are bitten and ascends symmetrically or asymmetrically. Quadriplegia, urinary and fecal incontinence and respiratory problems are often noted over a period of a few days or weeks. At this point, death is inevitable (Leung, Davies et al. 2007).

Diagnosis

In the United States, about 120,000 animals are tested for rabies each year. From this large number tested, only about 6% of these animals are found to be rabid. Wild animals account for nearly 10% of positive results whereas domestic animals such as cats and dogs represent less than 1% of animals that test positive. In animals, the definitive diagnosis of rabies is made by sampling tissue from two separate parts of the brain of the animal. This means that the animal must be euthanized. The test is fairly quick and provides adequate test results within 24-72 hours after the animal has been euthanized (Diagnosis in Animals and Humans 2011).

The brain tissue samples can be tested through immunofluorescence or polymerase chain reaction (PCR) techniques (Leung, Davies et al. 2007). For low probability cases, of dogs and cats, the animal does not necessarily need to be euthanized. Often a 10 day observation period is appropriate to rule out the potential risk to the human. Local and state health departments will be able to help one determine the appropriate course of action to take based on current regulations and safety protocols (Diagnosis in Animals and Humans 2011).

Rabies diagnosis in humans requires several testing procedures to ensure the safety of the human. Tests can be performed on saliva, serum, spinal fluid and skin biopsies that include hair follicles at the base of the neck. Testing for rabies viral antibodies in the serum can be a diagnostic tool for the unvaccinated individual. If a human has been previously vaccinated for rabies, antibodies in the cerebrospinal fluid are produced by only those who are infected with rabies. The virus can also be isolated from saliva cultures (Leung, Davies et al. 2007).

Treatment

Due to the lack of successful treatment protocols, a person or animal with rabies symptoms is nearly always fatal. In humans, the only treatment is supportive care such as anticonvulsants, heavy sedation, and mechanical ventilation. Doctors and researchers have tried a combination of drugs to combat the effects of rabies but these have not proved useful (Leung, Davies et al. 2007). In 2004, a 15 year old Wisconsin girl was admitted to Children's Hospital of Wisconsin after being bitten by a bat at a church service nearly a month prior. Upon arriving at the hospital the girl exhibited symptoms of full blown rabies. The girl had not been previously vaccinated for rabies and was placed under severe sedation. She was given a cocktail of medications and survived the experience with no known damage to her body (Rosenthal 2004).

Ironically, this same girl encountered a second experience with rabies and her pets. She recently found a dead bat in her dog's kennel that she collected and submitted to the Wisconsin State Laboratory of Hygiene which confirmed the animal was infected with rabies. Luckily, her dogs had been previously vaccinated for rabies by a licensed veterinarian. All three of her dogs received a booster vaccinated and were placed on a 60 day quarantine at her home as required by state law (Peterson 2013).

An important part in rabies treatment is immediate wound care. Flushing the wound, bite or scratch with running water and soap immediately will aide in the prevention of contracting rabies. Rubbing alcohol, cetermide, or iodine should also be applied; then one should seek immediate medical attention. Antibiotics and a tetanus toxoid booster vaccine should be administered. Suturing the wound should be avoided if at all possible. Post exposure prophylaxis (PEP) treatment is available only if the patient is not exhibiting symptoms of rabies. The timeline, amount and frequency of preexposure prophylaxis (PrEP) will depend on the individual's vaccination status prior to the incident. A person that has been vaccinated within two years of the incident will receive 2 doses of the vaccine on day 0 and day 3. A person that has not had their rabies preexposure vaccination within the two-year window will receive human rabies immune globulin (HRIG). HRIG should be given within seven days of the possible rabies exposure and will provide immediate neutralizing antibodies that directly are related to the rabies virus. If a person has not been previously vaccinated for rabies, the person must receive five doses of modern cell culture vaccine on days 0, 3, 7, 14 and 28 (Leung, Davies et al. 2007)

Prevention

Prevention of rabies is key. Because of the high failure for treatment, proper education about this disease is of utmost importance. Proper wound care following an animal bite or scratch can dramatically decrease the individual's chance of contracting rabies. Seeking medical attention for post exposure prophylaxis is also highly effective in the prevention of rabies (Leung, Davies et al. 2007).

The concept of herd immunity or community immunity is a form of protection for the individual has been proposed as a method of protection in populations. The theory is that the vaccination of a large portion of the population or herd provides protection to those who have not been vaccinated. The greater the population of vaccinated individuals the greater the herd immunity, therefore leaving a smaller number of susceptible individuals that are likely to become ill. Control of rabies greatly relies on herd immunity of domestic animals and wildlife.

Vaccination of domestic animals through veterinary professionals has dramatically added to the number of the vaccinations of the susceptible population. Wildlife vectors and stray or unclaimed animals provide a large number of unvaccinated individuals that are potential vectors for rabies transmission (Leung, Davies et al. 2007). There have been many efforts by state departments, veterinarians, shelters, and rescue organizations to reduce the number of stray animals in the United States through spaying, neutering, and catch-and-release programs that also provide rabies vaccination but has been only mildly effective due to the a high turnover rate within a population. As in all cases, funding can prove to be difficult to maintain an effective rabies prevention program. The estimated funding of rabies control methods in the United States alone exceeds 300 million dollars. Annual turnover in the United States dog population is approximately 25% causing major lapse in vaccinated individuals (Rabies Around the World 2011). Education is one of the most effective tools for rabies prevention. Children should be

taught to not approach unfamiliar dogs or wildlife. Children and adults should leave animals that are nursing, eating, or caring for young and are encouraged to treat animals with respect and not taunt or tease them (Leung, Davies et al. 2007). If an individual finds a stray animal near their neighborhood they should contact their local animal shelter who are properly immunized and trained on how to handle animals. There are many education programs and materials available for teachers and parents at local veterinarians, public health departments and online resources.

Chapter 3: Case Studies

Public Health Aspects of Rabies

On October 20, 1974 a soldier was admitted to USAF Hospital Clark with clinical symptoms of rabies. The patient revealed that he has a history of a dog bite from a puppy on August 18, 1974 in a small neighborhood near Clark Air Force Base in the Philippines. The puppy became ill and died on August 25, 1974. Because of poor communication, the patient was unaware that the puppy had died for several weeks. After the patient discovered that the puppy that bit him died, he was able to seek medical attention and receive post exposure prophylaxis on September 25, 1974. The last dose of post exposure was given on October 15, 1974. On October 18, 1974 the soldier returned to the emergency room with an elevated temperature and hyperventilation. On October 24, 1974, the soldier died and an autopsy confirmed the suspicion of rabies. Environmental Health Services was contacted to aid in the crisis. Many nurses, doctors and fellow soldiers had been exposed to the soldier from the time the bite occurred until his death. Centers for Disease Control interviewed anyone that came in contact with the soldier or any bodily fluids and were able to determine if post exposure prophylaxis was required.

Luckily, no other humans in contact with the soldier contracted rabies and the case was closed. It was a priority of the government at this point to provide education to the public about rabies and preventative measures (Fester 1975).

Imported Human Rabies in a US Army Soldier, New York 2011

In August of 2011, a soldier returning from Germany to Fort Drum, New York began to experience neck pain during his travels. When he reached Fort Drum, the soldier went to the emergency room and was dismissed with the diagnosis of neck tendonitis and gastritis. On August 15 and 16, he visited a chiropractor for his pain. August 19, the soldier was seen at Fort Drum's medical facility and was dehydrated and hydrophobic. The soldier was lucid enough to explain to the medical staff that he had encountered a dog bite while deployed in Afghanistan in January 2011. At that time, the medical staff notified the New York State Department and the CDC due to the high probability the soldier was suspected of rabies. The hospital staff took immediate precautions by adding gloves, goggles, gowns, and facemasks for anyone who had come in contact with the patient. After thirteen days of experimental treatments and severe sedation, the family made the decision to withdraw life support and the soldier passed away shortly after on August 31, 2011.

FIGURE. Timeline of events surrounding an imported case of human rabies in a U.S. Army soldier — Afghanistan, Germany, and New York, 2011

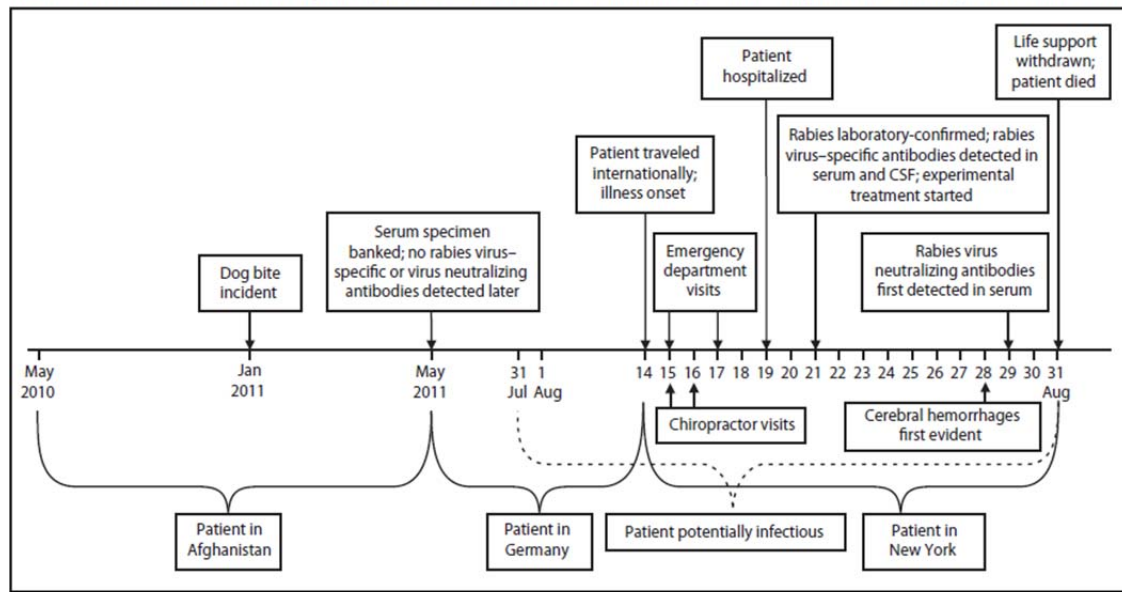


Figure 1:

On August 19, the New York Health Department and the CDC started to interview anyone that was in contact with the soldier from the time of infection until his death. The investigation revealed that 190 people were in contact with the soldier and thirteen of those persons met the exposure criteria. This criterion included anyone who was in contact with the soldier's mucus membranes, wounds, saliva, central nervous fluid, neural tissue or tears. Of these thirteen people, all received PEP (Javaid, Amzuta et al. 2012).

Rabies in a Dog Imported from Iraq – New Jersey, June 2008

The number of animals in 1950 that were reported to be rabid was over 5,000 in the United States. In 2006 that number dropped to 79 because of rabies vaccinations, stray dog control and successful quarantine periods. On June 18, 2008, an 11 month old a mixed breed dog was shipped to into the United States as part of an animal rescue mission with 23 other dogs from Iraq. The dogs were legally imported into the United States while under veterinary care.

All dogs were vaccinated for rabies immediately prior to departing Iraq. Upon arrival to the states, the dog was hospitalized with severe diarrhea, fever, wobbly gait, agitation, and crying. The dog's condition deteriorated and the staff veterinarian humanely euthanized the dog. Specimens from the dog were collected and submitted for rabies testing through the CDC and the Public Health and Environmental Laboratories. At the CDC, rabies was confirmed and typed as a variant associated with dogs in the Middle East.

A full investigation of the confirmed rabies positive animal was performed for all animals and personal that might have come in contact with the animal. Although the animals were required to be shipped in separate animal enclosures, it was admitted that during the travel, the animals were allowed to co-mingle. The CDC recommended immediately vaccinating the remaining animals and a 6-month quarantine period of all of the animals.

Prior to the shipment of the dog, a US soldier in Baghdad housed the dog in an indoor-outdoor run, had not been previously been vaccinated and reported no signs of illness for the 7 months that the confirmed rabies positive dog was in his possession (Mangieri, Sorhage et al. 2008).

Chapter 4: Mental Health and the Military

The military has experienced a large spike in the number of diagnosed cases of mental illness within active duty troops and soldiers returning from deployment. Among the 1.4 million active members of the Armed Forces, mental disorders are the leading cause of hospitalized men and second among women. The decline of mental health can be directly related to the active duty status of the military service (Otto, O'Donnell et al. 2010). Additionally, mental disorders

have been associated with participation of combat activities such as fitness training, field practice and operational training (Taubman 2009). For the purpose of mental disorder studies, the military uses a standard diagnosis by using the International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM). In the most part, these descriptions correlate with the standard, widely accepted Diagnostic and Statistical Manual, 4th edition (DSM-IV). Since the 1990s during the Gulf War, members of the armed forces have completed a predeployment questionnaire that is used to assess individual's preparedness prior to deployment. This questionnaire is designed to evaluate the individual's current mental health and expose any past mental health events (Taubman 2009).

A surveillance study conducted over 7 years revealed that out of 1,009,279 active service members that had at least one documented deployment during Operation Enduring Freedom (OEF) or Operation Iraqi Freedom (OIF), 78,067 (7.7%) had at least one mental disorder-related encounter prior to deployment. On this same scale, 214,871 (21.3%) had at least one mental disorder-related encounter after deployment. The purpose of the study was to detail the timing of pre or postdeployment related mental-disorders. The researchers found that more than 40% of soldiers with any predeployment mental disorder-related diagnosis had at least one mental disorder-related encounter after deploying to OEF or OIF. In contrast, less than 20% of soldiers with no predeployment mental health related history had postdeployment encounters.

Table 2. Percentages of U.S. service members who received mental disorder diagnoses after deploying to OEF/OIF (absolute and relative to deployers with no mental disorder diagnoses before deploying), in relation to categories of mental disorder diagnoses prior to deploying, January 2002-December 2006

Mental disorder diagnosis before deploying	Number of deployers	Mental disorder diagnoses after deploying													
		Any mental disorder after deploying		Adjustment reaction		Substance abuse		Anxiety		PTSD		Depression		Other	
		%	Relative %	%	Relative %	%	Relative %	%	Relative %	%	Relative %	%	Relative %	%	Relative %
None	931,212	19.5	1.00	7.4	1.00	4.4	1.00	3.5	1.00	3.4	1.00	3.0	1.00	10.5	1.00
Any mental disorder diagnosis	78,067	42.1	2.16	16.3	2.20	11.5	2.61	9.8	2.79	6.7	1.96	10.0	3.38	23.8	2.28
Adjustment reaction	24,487	46.2	2.36	23.4	3.16	8.3	1.90	11.1	3.17	8.0	2.33	12.5	4.22	27.4	2.62
Substance abuse	24,059	39.7	2.03	12.0	1.62	24.5	5.59	6.2	1.77	6.1	1.78	5.4	1.84	16.4	1.56
Anxiety disorder	9,959	52.0	2.66	19.1	2.58	7.2	1.65	25.7	7.36	8.0	2.33	13.8	4.69	29.7	2.84
PTSD	1,085	56.6	2.90	20.0	2.70	8.2	1.87	15.9	4.57	26.9	7.81	17.0	5.75	34.3	3.28
Depression	9,670	56.4	2.89	20.6	2.79	7.9	1.80	14.0	4.02	8.4	2.43	27.2	9.23	36.9	3.53
Other mental disorder	34,560	43.9	2.25	17.1	2.30	7.4	1.68	10.2	2.93	6.9	2.00	12.0	4.08	29.0	2.78

Figure 2:

Figure 2 presents data that shows soldiers with PTSD or depression prior to deployment were nearly 3 times more likely to have a mental disorder related event after deploying (Taubman 2009).

Chapter 5: Animal Assisted Activities and Animal Assisted Therapy

Animal Assisted Activities (AAA) as defined by PetPartners, formerly Delta Society, provides opportunities for motivational, education, recreational and or therapeutic benefits to enhance quality of life. AAA animals are basically placed in a meet-and-greet situation that involves visiting individuals or a small group of people. The activities they perform are not specific and are usually not under the direction of a health care professional. The visits may be spontaneous and last as long or short as needed. An example of an AAA would be an individual and her dog traveling to a long-term care facility to demonstrate obedience training in front of a crowd. Participants may interact with the team. No official records are maintained during these visits (PetPartners 2012).

Animal Assisted Therapy (AAT) provides a more specific, goal-directed intervention in which the team is asked to meet specific criteria as part of a treatment process. AAT is directed by a healthcare professional with specialized expertise within the scope of their profession. AAT is documented and evaluated by the healthcare professional. The objective of AAT is to promote improvement in human physical, social, emotional, and/or cognitive functioning. Progress should be measured and teams are assigned specific goals for each individual they visit. An example of AAT in practice would be an individual and their dog would be assigned a room in which a patient was involved in an accident in which their limb was amputated. A team may be asked to interact with the patient to encourage movement of limbs and strengthening exercises such as brushing the dog, manipulating small buckles on the dogs leash and working vest, or walking the dog on a double leash. The tasks that are assigned not only provide a mode of physical therapy to the patient but also aide in recovery by reducing loneliness and anxiety (PetPartners 2012).

Both AAA and AAT programs provide benefits to individuals or large groups and are easily implemented into virtually any setting. The United States military has participated in some AAT programs in early 2007 when America's VetDogs in Smithtown, NY donated two black Labrador retrievers. The two dogs, SPC Boe and Budge, were trained and deployed with two occupational therapists to Iraq where they remained for 24 months. Adding the two dogs to a military based program was easy from a public health standpoint because the military already manages protocols and procedures for military working dogs that deploy with units. The challenging aspect was measuring the effectiveness of the dogs because it is very hard to physically measure PTSD symptoms, suicides prevented or marriages saved. Anecdotal examples of benefits of AAT in action have been documented. For example: "I used to take five

different medication for my PTSD. Now I take two.” “When I have a nightmare, he puts his muzzle into my face, and the nightmare stops” (Ritchie, Amaker 2012). These accounts are extremely valuable to the process of expressing the human animal bond but lack the scientific data for evidence-based research. Protocols and procedures within the military and most other organizations require scientific, evidence-based research before they are willing to implement such programs.

Military organizations have established some programs that allow soldiers, postdeployment, to interact, train, and utilize AAT program benefits. A program designed by the Walter Reed National Military Medical Center (WRNMMC) partnered with the Washington Humane Society (WHS) was established for service members to complete training exercises with surrendered dogs that were accepted into the program. The program, Dog Tags, is a three-tiered program geared towards providing mental, physical and emotional stimulation for both the patients at WRNMMC and prescreened dogs at WHS. It is the goal of the participants and their dog to focus on activities other than the normal medical appointments, surgeries, and monotonous hospital routines. Level 1 of the training programs teaches the soldiers how to train and a brief history of dogs. They then learn about dog body language, foundational obedience training skills, and become familiar with obedience obstacles and training equipment. They introduce their dogs to unfamiliar objects and build confidence as a team. Level two of the Dog Tags program is geared to resolving common household problems such as chewing, jumping or house soiling. They also work on their observational skills and assist other students outside of class by offering advice to other teams. There are some lecture and reading assignments but overall the participants enjoy learning more about how to improve their dog handling skills and become a successful team. During level two, they also prepare enrichment activities for other

shelter animals to alleviate their boredom while they are being held. Level three of the program is the most in-depth portion of the training. The team works on advanced obedience skills that allow them to perform in large groups and also teaches them skills on how to instruct obedience classes to the general public or offer private training sessions after they are released from WRNMMC (Ritchie, Amaker 2012).

There are clear benefits achieved through the Dog Tag program for both members of the team. Dogs that were housed at the shelter have been transformed into educated, obedient pets and will greatly increase their adoptability and their future success. It is on the human part of the spectrum that the benefits are observed, not measured by physicians, nurses, and family members that work closely with the teams. Physically, participants in the program are able to gain fine motor skills, balance, and strength by working with the dogs on a daily basis. Mental stimulation is also a key goal of the therapeutic sessions. The team, dog and human, work on confidence building skills and break down complex tasks into tiny, manageable steps. Emotionally, learning what motivates the dogs to perform at a level expected by the trainer greatly demonstrates patience and persistence within the team. Hard work and successful demonstrations by the team adds a level of confidence that cannot be achieved by a patient at WRNMMC by lying in a hospital bed. Since 2008, Dog Tags has trained over 40 soldiers and helped about 75 dogs get adopted from the program into a forever home. Soldiers have reported starting their own dog training programs in the general public, volunteering at local shelters and becoming more outgoing in difficult situations in which they previously would not have been comfortable (Ritchie, Amaker 2012).

The human animal bond is a concept that is not easily defined because it is a sense of emotional attachment and attraction. The United State Military has struggled over the years to

educate and evaluate the number of animal incidents and bites in soldiers while deployed. In the United States, it is estimated that 37% of households own dogs and 30% of household own cats (USA, American Veterinary Medical Association 2012). It is of natural habit that animal owners who are deployed have infinity to seek the comfort or companionship of animals in the deployed environment. A surveillance report by the United States Armed Forces from 2001 through 2010 showed that there were over 20,000 animal related bite incidents during their monitoring period. Over 13,000 of these bites were dog related. On average, 5.6 animal bites occur every day in the deployed environment with males accounting for nearly 80% of incidents (MSMR 2011). Interestingly, soldiers have been educated on the risk of rabies and are warned to not interact with local stray animals but in many cases, the yearning for companionship is greater than the perceived personal risk.

Because of the high incidence of animal bites and the increase risk of rabies during deployment to the Middle East and Southwest Asia, the military should provide an alternative means of comfort and companionship for soldiers while deployed. The use of AAA/T animals that meet all veterinary recommended vaccination protocols and are deemed safe to interact with soldiers on a daily basis should be considered. In the past, the Armed Forces had deployed only a few animals to serve as therapy animals to soldiers. The Armed Forces must work closely with veterinarians, deployed soldiers, occupational therapists, and animal behavioral specialists to develop an accepted protocol for deployed AAA/T animals with units. A protocol of such must include vaccination protocols appropriate for the region of deployment, length of stay, funding, number of dogs to prove effectiveness, and duties of the dog while deployed. By deploying AAA/T teams it would likely decrease the desire for soldiers to seek companionship from stray animals. The benefits of deployed therapy animals, as shown in multiple reports, decrease the

likelihood of mental health related events, aids in reducing stress and increases overall moral or units. As demonstrated by SPC Boe and Budge the need for medication to reduce symptoms of PTSD decreased, interaction in crowds was easier, and transitioning back to civilian life after deployment was less difficult (Ritchie, Amaker 2012).

Rabies and Mental Health may seem very distant in the scientific world but both are highly preventable and manageable with proper education and alternative methods to deal with situations.

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