

Public Health Foodborne Illness Case Study During a Special Operations Forces Deployment to South America

MAJ Michael McCown, DVM; SFC Benjamin Grzeszak, 18D

ABSTRACT

Although many public health articles have been published detailing foodborne illness outbreaks, a medical literature search revealed no articles that detail a case study or a specific response of a deployed U.S. military unit to a potential foodborne illness. This article describes a recent public health case study of a U.S. Special Operations Forces (SOF) team sickened while deployed to South America. It highlights public health factors which may affect U.S. personnel deployed or serving overseas and may serve as a guide for a deployed SOF medic to reference in response to a potential food- or waterborne illness outbreak. **Methods:** Eight food samples and five water samples were collected. The food samples were obtained from the host nation kitchen that provided food to the SOF team. The water samples were collected from the kitchen as well as from multiple sites on the host nation base. These samples were packaged in sterile containers, stored at appropriate temperatures, and submitted to a U.S. Army diagnostic laboratory for analysis. **Results:** Laboratory results confirmed the presence of elevated aerobic plate counts (APCs) in the food prepared by the host nation and consumed by the SOF team. **Discussion:** High APCs in food are the primary indicator of improper sanitation of food preparation surfaces and utensils. **Conclusion:** This case study concluded that poor kitchen sanitation, improper food storage, preparation, and/or holding were the probable conditions that led to the team's symptoms.

These results emphasize the importance of ensuring safe food and water for U.S. personnel serving overseas, especially in a deployment or combat setting. Contaminated food and/or water will negatively impact the health and availability of forces, which may lead to mission failure. The SOF medic must respond to potential outbreaks and be able to (1) critically inspect food preparation areas and accurately advise commanders in order to correct deficiencies and (2) perform food/water surveillance testing consistently throughout a deployment and at any time in response to a potential outbreak.

INTRODUCTION

The health of U.S. men and women is of the utmost importance to the success of U.S. missions abroad, as well as to national security. This case study focuses on specific public health factors that affect SOF health in a combat or non-combat overseas deployment setting. These lessons learned can apply to larger units and other U.S. agencies serving outside of the U.S. (e.g., U.S. State Department personnel at U.S. Embassies).

Disease and Non-Battle Injury (DNBI) is an aspect of a unit's deployment safety and health that must receive ongoing surveillance and have continuous preventive measures applied. The entire public health picture must be fully developed through the use of public health factors that may negatively impact force health. Such factors include infectious disease, zoonotic disease, environmental hazards, and food/water contamination, among many others.

This article examines the unintentional contamination (e.g., bacterial, viral, chemical, etc.) of food and water, which leads to food/waterborne illness. The importance of food and water safety and quality assurance has been discussed previously in this Journal.¹ The SOF leadership, both command and medical, must emphasize the mandatory requirement of safe

food and water procurement and use by forward deployed personnel. Procuring, storing, preparing, and holding safe food and water in a deployment setting is ensured through knowledgeable mission planning, education of team members, and surveillance testing in the field. The SOF medic must be the team's food/water safety subject matter expert (SME). He or she must be ever vigilant and ensure the team employs preventive medicine countermeasures to prevent disease and illness. By using his food/water surveillance skill-set, he must be ever vigilant for a potential foodborne illness outbreak and then be able to act swiftly in response to an outbreak. This article presents a specific case of a SOF team sickened while deployed and describes techniques and procedures for the SOF medic to reference and apply in the future if presented with a similar situation.

SITUATION

An entire SOF team/element became intermittently and recurrently ill while deployed five months to South America. The team's symptoms included intermittent nausea, vomiting, profuse watery diarrhea, stomach aches, malaise, mild dehydration, and headache. These symptoms recurred over the five month deployment and seemed to begin in the evenings hours,

and sometimes days, after ingesting food prepared by the host nation. The effects were lost duty days and interference with the accomplishment of the team's specialized missions. The public health investigation was initiated to determine the cause of these symptoms and to preserve mission accomplishment.

CASE STUDY

Problem: The entire SOF team/element became ill with gastrointestinal symptoms, which caused general malaise for the deployed SOF personnel and mission delay/disruption.

Methods: The affected SOF team members were the case study subjects. Host nation personnel who had close contact with the SOF team and who ate at the same host nation dining establishments were included in the study population to determine the extent of the illness and to compare and contrast their health with that of the SOF team members.

Findings: All U.S. SOF personnel experienced the previously described symptoms. Approximately 50% of selected host nation personnel described similar symptoms over this time period.

Case study: The study initially focused on obtaining a clear clinical picture and overall history on each subject. The study team obtained clinical signs and symptoms, as well as their duration. All of the SOF team members had experienced gastrointestinal symptoms at least once over the course of the five months while deployed in-country. Most also had recurrence of the same symptoms over the five month period. Team members reported most of the gastrointestinal symptoms occurred in the evenings soon after eating at the host nation dining establishment. Given the symptoms, duration, and recurrence of the symptoms associated with food ingestion from similar sources, the case study then focused on food and water analysis.

Other public health considerations associated with an austere South American deployment environment were examined. Close living conditions are factors associated with the spread of infectious diseases (e.g. respiratory). Interaction with animals or exposure to certain vectors or reservoirs (e.g. ticks) may implicate a zoonotic disease (e.g. rickettsial infections). Infectious and zoonotic diseases were ruled out through examination, history, and study. Examinations determined the team was healthy and free of infectious disease. A thorough history and description of the gastrointestinal symptoms implicated foodborne or waterborne illness as the probable cause.

Eight food samples and five water samples were collected. The food samples were obtained from the host nation kitchen that prepared food for the SOF team. The water samples were collected from the kitchen as well as from multiple sites on the host nation base. Ice and water sources used to make tea, coffee, and juices were collected and are critical components to the sampling process. All of the collected samples were packaged in sterile containers, stored at appropriate temperatures, and submitted to a U.S. Army diagnostic laboratory for analysis.

RESULTS

The U.S. Army diagnostic laboratory conducted multi-analysis laboratory testing on all of the food, water, and ice samples we collected. The results confirmed the presence of elevated

aerobic plate counts (APC) in the food prepared by the host nation and consumed by the SOF team. The major bacterial pathogens such as *E. coli* O157:H7, Salmonella, Campylobacter, Clostridium, Shigella, Bacillus, Staphylococcus, Streptococcus, and Listeria usually implicated in foodborne illness cases were ruled out by the laboratory analysis. Likewise, complete microbial, chemical, and radiological analyses of the water from multiple sources on the base ruled out water contamination as a cause.

DISCUSSION

Aerobic plate counts are used as an indicator of bacteria levels in foods. APCs are used to evaluate the sanitary condition of foods and the utensils and surfaces used in the food.² Elevated APCs directly correlate with inadequate sanitation and food time-temperature abuse; in our case, poor kitchen sanitation and improper food storage, preparation, and holding were the probable causes of the team's symptoms. Food is considered time-temperature abused when it has remained in the temperature danger zone of 41°F to 140°F [which is ideal for the rapid growth of dangerous bacteria] for more than four hours.³ This can also occur if food is not cooked, cooled, reheated or held appropriately. Additionally, appropriate food surface and processing sanitation chemicals were not used. Cross contamination occurred from unsanitary hands, utensils, counter tops, and/or cutting boards.

Without exception, in a deployment setting, the SOF medic must critically inspect food and water sources and educate host nation food handlers and cooks. This should occur on an ongoing basis with focus on proper sanitary procedures and proper food storage, cooking, and holding. The SOF medic should evaluate the entire cooking and cleaning processes and assist the host nation in developing standard operating procedures (SOPs) and training to better decrease the risk of food and waterborne illness.

The Centers for Disease Control and Prevention (CDC) estimates that 76 million foodborne illness cases occur each year in the US. This estimate equates to one in four Americans becoming ill after eating contaminated foods. While most foodborne illness cases go unreported to local health departments, nearly 13.8 million food poisoning cases are caused by known agents—30% by bacteria, 67% by viruses, and 3% by parasites.⁴ The major foodborne illness caused by bacterial pathogens include *E. coli* including O157:H7, Salmonella, Campylobacter, Clostridium, Shigella, Bacillus, Staphylococcus, Streptococcus, and Listeria. The major viruses include Enterovirus, Hepatitis A and E, Norovirus, and Rotavirus. The major parasitic causes of foodborne illness are various species of flatworms, roundworms, and protozoa.⁵ The major infectious causes of waterborne diseases are protozoa (Cryptosporidium, Giardia), viruses (Adenovirus, Hepatitis A), bacteria, or parasites.⁶ It is important for the SOF medic to review and know the signs and symptoms, incubation periods, and usual duration of illness resulting from each of these pathogens.

The following is a food- and waterborne illness outbreak guide for the SOF medic to reference: (*This guide was developed after referencing the Kansas Department of Health and Environment Division of Health's Foodborne Illness and Outbreak Investigation Manual*⁷ Another reference is *Technical Guide 188, US Army Food and Water Vulnerability Assessment Guide*)

1. Determine that an outbreak has occurred (know the symptoms of food- and waterborne illness)
2. Contact and coordinate with key personnel (Group medical or host nation medical)
3. Obtain clinical specimens and food/water samples for laboratory analysis
4. Define cases and conduct case study/findings
5. Describe the outbreak by time, place, and person
6. Develop possible hypotheses
7. Plan and conduct the food/water case study to test hypotheses
8. Analyze the data collected and interpret results
9. Report the findings of the outbreak investigation to the affected unit, higher headquarters, and the host nation's liaison.
10. Consult with the host nation's authorities to emplace preventive measures to ensure outbreak does not recur

CONCLUSION

Bottom line, the SOF medic must possess an effective preventive medicine skill-set in order to be knowledgeable of the devastating impacts of food and water contamination leading to food/waterborne illness outbreaks, how to prevent them, and how to educate personnel to implement appropriate countermeasures.

These study results reinforce the importance of ensuring safe food and water for deployed U.S. personnel. Further, the critical nature of the SOF medic's involvement with the host nation's food preparation and sanitation SOP development is clear. Food and water testing and surveillance studies can and should be performed by the SOF medic. Such surveillance will decrease risk factors associated with food- and waterborne illness outbreaks. If an outbreak is suspected, the SOF medic should follow a clear and focused investigative procedure to determine the cause or causal factors to medically respond quickly based on the clinical picture. The use of appropriate food- and waterborne illness outbreak investigative procedures should be developed into a team, company, or battalion SOPs prior to a deployment.

Blood, urine, and fecal testing is indicated when signs and symptoms dictate in order to definitively rule out

infectious and parasitic diseases. The SOF medic should obtain these samples and submit them to a U.S. Army diagnostic laboratory or work with a local host nation hospital and laboratory. The latter may be more appropriate in an austere deployment site due to packaging/shipping limitations.

Food and water analyses are also critical to the public health of the host nation military populations and civilian communities in areas that SOF personnel are deployed. The goal of this article is to provide the SOF medic a guide for evaluating or investigating possible food or waterborne illnesses in a SOF team or a host nation community. The importance to SOF is that these efforts and preventive measures help to ensure U.S. mission success by conserving troop health and by improving the local population's health. It is the SOF medic's duty to understand the critical nature of food and water safety, how to test its safety, and then to utilize the test findings and respond appropriately to protect and promote the health of SOF and other U.S. military forces, associated host nation forces, and local civilians in the area.

REFERENCES

1. McCown M, Grzeszak B, Rada J. (2009). Veterinary Public Health Essentials to Deployment Health Surveillance: Applying Zoonotic Disease Surveillance and Food/Water Safety at SOF Deployment Sites, *Journal of Special Operations Medicine*, Vol 9,Ed 4:26-31.
2. State of Wisconsin Department of Agriculture, Trade and Consumer Protection Division of Food Safety, Fact Sheet For Food Processors, November 2002. Retrieved from datcp.state.wi.us/fs/business/food/publications/pdf/MicroorganFactSheets/AerobicPlateCount.pdf.
3. National Sanitation Foundation (NSF) Food Safety Retrieved from www.nsf.org/consumer/food_safety/fsmonth_tempabuse.asp?program=FoodSaf.
4. Retrieved from <http://www.foodborneillness.com/>.
5. Retrieved from http://en.wikipedia.org/wiki/Foodborne_illness.
6. Retrieved from http://en.wikipedia.org/wiki/Waterborne_diseases.
7. Kansas Department of Health and Environment Division of Health, Foodborne Illness and Outbreak Investigation Manual, March 2008. Retrieved from www.kdheks.gov/epi/download/kansas_foodborne_illness_manual.pdf.

Dr. McCown enlisted in the U.S. Army in 1993. Following graduation from the University of Florida College of Veterinary Medicine, he obtained a commission in 2001. He has had the distinct honor and privilege to work with SOF medics and other SOF NCOs while serving on active duty with Special Forces thru 2005. He served one combat tour in Afghanistan in support of Operation Enduring Freedom, three deployments to South America, and a series of other missions to Central and South America.

SFC Benjamin Grzeszak is a Special Forces Medical Sergeant currently assigned to 7th SFG(A). He has served three combat tours with 7th SFG(A) in Afghanistan in support of Operation Enduring Freedom and two deployments to South America.