Implementing and Evaluating an Advanced Bloodborne Pathogen Training for the Department of Campus Recreation at Clemson University. A Mixed Methods Study of Training Effectiveness and Retention

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IMPLEMENTING AND EVALUATING AN ADVANCED BLOODBORNE PATHOGEN TRAINING FOR THE DEPARTMENT OF CAMPUS RECREATION AT CLEMSON UNIVERSITY. A MIXED METHODS STUDY OF TRAINING EFFECTIVENESS AND RETENTION

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Parks, Recreation, and Tourism Management

by
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Accepted by:
Dr. Barry Garst, Committee Chair
Dr. Skye Arthur-Banning
Dr. Michael Godfrey
ABSTRACT

Employee training consist on the development process to foster learning of new techniques and methods to perform a job with efficiency and effectiveness. Effective training programs help employees concentrate on individual career development and ultimately assist in achieving organizational short and long-term objectives. The purpose of this study is to implement and evaluate a developed advanced Bloodborne Pathogens (BBP) training program targeting collegiate recreation student employees within the Department of Campus Recreation at Clemson University.

This mixed-methods study explores the effectiveness of an advanced bloodborne pathogen employee training with student staff and evaluates whether Campus Recreation should invest in the implementation of this training with the additional 300 students employed throughout the department and during future employee trainings. A sample of 75 student employee participants completed a pre-training assessment, followed by the delivery of a customized bloodborne pathogen training program. The 25-minute training focused on reviewing adequate blood/body-fluid spill clean-up procedures specific to Clemson University Campus Recreation. After the training, all participants completed a post-training test. A total of 45 participants completed an additional posttest 8-weeks after the training delivery date.

Employees’ pretest, posttest and 8-week posttest scores were compared to determine acquisition and retention of knowledge from completion of the advanced BBP training. The results obtained from this study show an increase in knowledge regarding bloodborne pathogen safety, as well as retention of knowledge. These findings support
the importance of providing employees with relevant training opportunities as well as the benefits of enhancing existing training programs to fit the needs of specific occupations and work settings.
DEDICATION

I would like to dedicate this work to my mom and dad for believing in me, and for always being by my side. Your love and support has made all of this possible.

Omma, Appa, we did it!
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CHAPTER 1
INTRODUCTION

Every year, thousands of companies across the United States spend an estimated $164 billion on employee training programs (Hillsman & Kupritz, 2007; Phillips & Phillips, 2016). The main purpose of providing such learning and development opportunities is to ensure that employees are properly prepared to carry out their assigned roles. Providing training and learning opportunities also demonstrates an organization’s investment in, and commitment to, its employees (Blume, Ford, Baldwin & Huang, 2010). Training programs can target a variety of topics such as job specific skills, ethical and legal issues, or health and safety concerns. Regardless of topic or delivery method, employers expect their large financial investments in these trainings to yield visible and measurable benefits to the organization and that the training will empower employees to transfer new knowledge and skills to the benefit of all (Blume, Ford, Baldwin & Huang, 2010). Therefore, a training program has little to no value to an employer if employees do not utilize or apply the skills or behaviors being taught (Yamnill & McLean, 2001).

According to Baldwin and Ford’s Transfer of Training model (1998), a training program is divided into three necessary elements: training inputs, training outputs and conditions of transfer. Training inputs include variables such as trainee characteristics, training design and delivery methods, and work environment. If all training inputs are taken into consideration and properly addressed, the training output results in learned behavior as well as retention. To complete the transfer of training process, the learned behavior must be generalized and maintained (Baldwin & Ford, 2008; Yamnill &
McLean, 2001). During employee training, transfer of training is fulfilled when an employee is capable of generalizing and applying learned behaviors or skills from the training program into their occupational roles and maintains said behavior over time (Baldwin & Ford, 1998; Burke & Hutchins, 2007).

Moreover, after the implementation of a training program, said program should be then evaluated to determine if the training accomplished its intended purpose (Kirkpatrick, 1967). The purpose of evaluating a training program is not to focus on the success or failure of the program, but rather to utilize the collected data to better understand how the training inputs can cause variations on training outputs. The evaluation of a training program allows the use of successful training variations and elements, such as relevant content and effective delivery methods in the future development of more effective trainings. This process also serves to address and improve training weaknesses such as low trainee motivation or low retention (Cohen, Colligan, Sinclair, Newman & Schuler, 1998; Kirkpatrick, 1967). Furthermore, evaluation can also guide researchers towards understanding how training influences employees’ knowledge and skills, and if the training program has the capacity to provide long-term benefits to individuals receiving training (NIOSH, 1999).

Professionals and employees working within the recreation field are amongst the many occupations that resort to training programs in order to ensure their employees are capable of performing their duties and responsibilities to the best of their ability. From camp counselors to recreational therapists and wilderness specialists, most occupations within the recreation field will require the completion of one or multiple training
programs (Welch, Clement, & Berman, 2009). In recent years, there has been an increase in recreation professions that require some type of first aid, cardiopulmonary resuscitation (CPR), and automatic external defibrillation (AED) training certification (Welch, Clement, & Berman, 2009). Because a number of occupations within the recreation field involve close interaction with one or multiple individuals in addition to a certain level of physical activity, an increasing number of organizations are requiring their employees to hold some level of CPR/AED/First Aid certification in order to reduce the incidence of risk and legal liability (Kerns & Moffit, 2017).

The Clemson University Department of Campus recreation employs close to 350 full-time and student employees that perform essential daily operations and tasks across a variety of facilities. These facilities include one indoor fitness center, one indoor natatorium, an outdoor recreation and wellness facility and multiple outdoor fields. The facilities house several programs including group fitness, club sports, personal training, intramural sports and multiple student development activities. Additionally, Campus Recreation student employees have the opportunity to hold varied positions within the department, such as Recreation Supervisors, Intramural Sports Officials, Operations Assistant, Maintenance personnel, Lifeguards, and Outdoor Recreation Guide. Although duties and responsibilities vary according to each position, the ultimate goal is to provide a safe and enjoyable environment for patrons. The Department of Campus Recreation serves an estimated 15,000 patrons per school year, which is comprised of undergraduate and graduate students, faculty and staff, as well as alumni and members of the community (Clemson University Department of Campus Recreation, 2017).
In the event that an individual or patron experiences an injury or illness that causes the release of blood or body fluid during participation in any activity or program within Campus Recreation, student staff are expected to be the first responders to the incident. Student staff members responding to the incident can potentially become exposed to blood borne pathogens when responding to an incident that involves spilled blood or body fluids. Blood Borne Pathogens (BBP) are infectious microorganisms in human blood that can cause several diseases (United States Department of Labor, 2017). Serious diseases such as hepatitis B, hepatitis C and AIDS can be transmitted through contact with blood that is infected with pathogens (Committee on Sports Medicine and Fitness, 1999). Although incidents involving disease transmission through blood contact do not occur frequently, reported cases support the idea of blood contact prevention (Mast, Goodman, Bond, Favero & Drotman, 1995).

From January 2016 to December 2017, employees of the Department of Campus Recreation have reported a total of 320 injuries that occurred in Campus Recreation programs and facilities, from which 55 (17.2%) involved bleeding or release of body fluid (Clemson University Department of Campus Recreation, 2016-2017). To reduce the risk of exposure and transmission, current employees of Clemson Campus Recreation are required to take an online bloodborne pathogen training developed by the Occupational Safety and Health Administration (OSHA). Currently, OSHA is the principal provider of an online bloodborne pathogen training. A small number of additional organizations (e.g., American Heart Association, American Red Cross) provide alternative bloodborne pathogen trainings, but all trainings are ultimately regulated by OSHA (United States
Department of Labor, 2017). Because this training is directed towards different occupations, the content is presented on a general knowledge and basic skill level.

OSHA’s bloodborne pathogens online training consists of a 30-minute training session which covers general information about bloodborne pathogens and instructs the basic skills to adequately clean a blood or body-fluid spill through videos. Once the individual has finalized the online course segment, they must complete a short 10-question test to receive a bloodborne pathogen certification. It is expected that after completing the OSHA bloodborne pathogen training, campus recreation employees are capable of responding adequately to blood or body fluid spills and are familiar with appropriate cleaning procedures. The OSHA bloodborne pathogen certification is valid for one year, and employees must re-take the course annually. Currently, the bloodborne pathogen certification does not provide or require continuing education modules throughout the year for certification holders to practice hands-on skills.

Despite completing the required OSHA bloodborne pathogen training, Campus Recreation professional staff have reported instances where Campus Recreation student employees failed to safely and adequately perform a blood/body fluid spill clean-up by not wearing appropriate personal protective equipment (PPE), utilizing inadequate supplies, or incorrectly disposing of contaminated material (H. Cox, Personal Communication, July 21, 2017). These issues could be in part due to incomplete transfer of training process from the OSHA bloodborne pathogen online training. To address these issues, it was determined that employees could possibly benefit from receiving an additional training program about bloodborne pathogens and adequate procedures.
Purpose

The purpose of this study was to deliver and evaluate a bloodborne pathogen training designed to address the needs of Clemson University Campus Recreation and its employees. The advanced BBP training was developed referencing the newly developed Clemson University Campus Recreation blood/body-fluid Standard Operation Procedure (SOP) with guidance from the Clemson University Department of Environmental Health and Safety (EHS). The training aimed to address issues where student employees fail to apply BBP standard procedures correctly and provides student employees with necessary knowledge on appropriate practices and procedures in the event of a blood or body fluid spill that are unique to the Clemson University Campus Recreation facilities (Fike Recreation Center, Intramural Fields) and equipment.

Having student employees that are knowledgeable of the risks associated with bloodborne pathogens and who demonstrate proficiency on adequate blood/body fluid cleanup procedures fosters a safe environment for student-workers as well as patrons utilizing the recreation facilities.

Research Questions

This study seeks to address the following questions:

1. Could the development of a BBP training program that is more applicable to a specific occupation or setting benefit the learning, retention and generalization of information learned from the OSHA BBP training program?

2. To what extent will the advanced bloodborne pathogen training (BBP) impact employees’ knowledge about BBP and practices associated with blood/body
fluid spill clean-up procedures?

3. To what extent will employees change blood/body fluid spill incident response practices after completing this training?
CHAPTER 2
REVIEW OF LITERATURE

Chapter II consists of the literature review that synthesizes research relevant to the study purpose. The first part of this literature review discusses the importance of employee training programs, particularly occupational health and safety trainings and its subsequent evaluation. The review then focuses on the Transfer of Training model, which is used as theoretical framework for this study. Lastly, a brief introduction to bloodborne pathogens, bloodborne pathogen training and its application in non-healthcare related settings is presented, finalized by a brief history of campus recreation programs and risk management within this setting.

Employee Training Programs

Training programs educate employees, change their attitudes and behaviors, and to enable employees to implement the newly acquired attitudes and behaviors in real life situations adapted to their occupational setting (Grossman & Salas, 2011; LaLonde, 2003). For businesses and organizations to remain competitive in a constantly changing economy, they must easily adapt to change and be able to fulfill the shifting demands of society (Grossman & Salas, 2011; LaLonde, 2003). Employees are an essential resource for organizations, and the success of a company heavily relies on the performance of its employees (Jehanzeb & Banshir, 2013). Organizations that provide training and development for their employees experience many benefits such as increased organizational performance, high customer satisfaction, and higher financial incomes (Jehanzeb & Banshir, 2013).
Occupational Health and Safety Training Programs

Health and safety are recognized as critical topics for employee training, because proper education and knowledge on these topics are important factors in the prevention or reduction of injuries (Brunette, 2005). The main purpose of Occupational Safety and Health training programs is to prepare workers to recognize possible hazards and the available and proper protection methods (Cohen et al., 1998). Workers that are better educated about potential risks and hazards increase their awareness of hazards within the workplace (Brunette, 2005). After receiving occupational health and safety trainings, employees are more likely to positively change safety behaviors in their workplace and increase their efficacy in specific tasks (Becker & Morawetz, 2004).

Although research has demonstrated benefits of receiving health and safety trainings, there are instances where employees have difficulty or are unable to generalize the knowledge and skills of a particular training to their specific roles or occupations (Williams, Ochsner, Marshall, Kimmel & Martino, 2010). For example, Williams et al. (2010) studied the linguistic and cultural difficulties Hispanic construction workers encountered during standard occupational safety training. The study customized an existing occupational health and safety training program specialized for Hispanic workers in the construction industry available in Spanish. During the customizing phase, researchers took into consideration the different education levels of workers and altered terminology and imaging to facilitate understanding of the training (Williams et al., 2010). Hispanic workers participating in the study reported an increase in occupational
safety knowledge and self-protective behaviors and attitudes. Workers that participated in the study also reported a decrease in construction related injuries (Williams et al., 2010).

Evaluation of Occupational Health and Safety Training Programs

Evaluation of employee training is the process of assessing the effectiveness of a training program. According to Kirkpatrick (1967), training effectiveness can be assessed in term of four different variables: reaction, learning, behavior and results. Reaction is the most basic level of evaluation, and analyzes the level that trainees liked the training program. Through the assessment of reactions, an employer can obtain valuable insight on training elements that could be improved, and make decisions about future training programs (Kirkpatrick, 1979). The second level of evaluation is the assessment of learning which measures what facts, principles, and skills the trainees acquired. A commonly used tool to asses learning is the analysis of pre/post-tests to determine the absorption of information (Kirkpatrick, 1979). The third and fourth level of training evaluation are assessment of behaviors and, results respectively. Behavior examines how well trainees apply the learned skills to the job, while results focus on the achievement of desired results (i.e., cost reduction, quality improvement). Both of these variables can provide in depth-information about training effectiveness, but both require complex and in-depth procedures (Kirkpatrick, 1979).

Many employee training programs fail to be evaluated, without realizing the opportunity this practice provides to gather important and valuable data. For example, the University of Alabama Birmingham performed a study to evaluate the effectiveness of a Hazardous Materials (HAZMAT) training delivered to more than 1,000 employees.
working at the Center for Labor Education and Research (CLEAR). Employees who had participated in the CLEAR HAZMAT training received a survey with questions focused on participant satisfaction, knowledge gain, and increase in positive attitude towards safety (Mukherjee, Overman, Leviton & Hilyer, 2000). Results revealed that individuals who had participated in the training reported an increase in behaviors regarding personal safety and health, increase in adequate disposal of hazardous chemicals and increase in contribution towards emergency preparedness compared to employees who had not received the training. (Mukherjee et al., 2000).

Organizations are unwilling to invest in a training program that has not been sufficiently evaluated in terms of its potential contribution to the organization, and its effectiveness (AlYahya & Mat, 2013). Evaluating a training program can facilitate the process of developing or improving a program and estimate or prove its effectiveness. Evaluation can help researchers answer questions such as how well did a program accomplish the set goal and what makes a program more useful or valuable against other programs? (Kirkpatrick, 1967). This study will utilize Kirkpatrick’s’ evaluation of training model as a framework to assess learning from an employee training program.

**Transfer of Training Model**

Employee training transfer is the process in which trainees effectively apply knowledge and skills gained from training into the job (Baldwin & Ford, 1988; Burke & Hutchins, 2007). Transfer of training is an essential process where training influences an organizations’ outcomes and results (Saks & Belcourt, 2006). According to this model, three main independent variables known as training inputs (e.g., trainee characteristics,
training design, work environment) directly influence training outputs (e.g., learning and retention). These outputs then must be generalized and maintained by trainees over time for a training to finalize the transferring process, as seen in Figure 1 (Baldwin & Ford, 1988; Saks & Belcourt, 2006).

Trainee characteristics include the level of motivation an individual display while participating in a training program. Individuals that show high levels of motivation are more likely to learn and retain information (Baldwin & Ford, 1988; Burke & Hutchins, 2007; Saks & Belcourt, 2006). There is little benefit in having highly motivated trainees if the training content is irrelevant and if the delivery method is not adequate. The content relevance of a training program will affect the learning and retention outcomes, and training that includes material with information that trainees can easily apply has a higher probability of retention (Burke & Hutchins, 2007). Trainings that include one or more interactive elements, in which trainees can practice learnt skills or behaviors during the training or actively participate in engaging dynamics can increase the likelihood of retention and facilitate the generalization stage (Baldwin & Ford, 1988; Burke & Hutchins, 2007; Grossman & Salas, 2011).

Additionally, training programs should take place in an environment where individuals feel supported and are given the opportunity to apply learnt behaviors or skills (Baldwin & Ford, 1988). In the case of employees working for an organization or company, employers are able to support employees by encouraging and providing different training and development opportunities (Grossman & Salas, 2011). Employers should then encourage and facilitate the generalization of employee knowledge gained
during training to finalize the transfer of training process (Burke & Hutchins, 2007; Grossman & Salas, 2011). This study relies on the Transfer of Training model as a theoretical framework to guide the development of employee training.

![Transfer of Training Model Diagram](Baldwin & Ford, 1988)

**The “Forgetting Curve” and Learning Retention**

Understanding the process of learning and forgetting is important to understand and optimize training programs. According to Ebbinghaus (1885), individuals experience a process in which the information learned declines after a specific period of time after the initial time of learning. This phenomenon is known as the forgetting curve, in which individual’s retention continues to decrease when the period of time after initial learning increases. The study by Ebbinghaus consisted on having an individual learn a list of syllables and recall those syllables in controlled periods of time. The study found that individuals began to forget information within 20-minutes of the initial learning time.
After 31 days of initial learning, participants demonstrated only 21% retention of the syllables learned (Nembhard & Uzumeri; 2000).

In a similar manner, a study by Einspruch, Lynch, Aufderheide, Nichol & Becker (2007) analyzed the effect of time after taking a CPR on individuals skill performance. The study found satisfactory skill performance immediately after training, but after a 2-month period, skill performance declined.

**Bloodborne Pathogens**

As defined by the United States Department of Labor, bloodborne pathogens are infectious microorganisms in human blood that can cause several diseases (OSHA, 2017). In 1984, a healthcare worker became infected with Human Immunodeficiency Virus (HIV) from a needle stick injury which had been used on a patient carrying HIV (Jagger, Perry, Gomaa & Phillips, 2008). Although most reported blood borne pathogen transmission cases occur from needle stick injuries, transmission can also occur when open injuries or mucous membranes (i.e. eyes, mouth) come in contact with infected blood, through human bites or sexual contact (Chen & Jenkins, 2007; Deuffic-Burban, Delarocque-Astagneau, Abiteboul, Yazdanpanah, 2011; Pirozzolo & LeMay, 2007).

After the Center for Disease Control (CDC) received six additional reports of HIV transmission occurring in occupational settings, the increase of transmission incidents alarmed the healthcare community about the threat of blood borne pathogen transmission, leading to the development of protective measures by government agencies (Jagger et al., 2008). The CDC released a series of guidelines titled Universal Precautions, which emphasized the use of personal protective equipment, correct handling and disposal of
sharps (i.e. needles, surgical blades), vaccinations, and annual training. At the same time, the Occupational Safety and Health Administration (OSHA) initiated a process to establish regulatory standards for employers. The implementation of both programs successfully reduced transmission incidents by 95% in less than a decade (Jagger et al., 2008).

When compared to healthcare related settings, non-healthcare settings (such as colleges and universities) have a relatively low incidence of bloodborne pathogen transmissions cases but are also at risk of exposure to bloodborne pathogens. A study by Chen and Jenkins (2007) surveyed 593 individuals working in a wide range of health and non-health related occupations who had potentially been exposed to blood borne pathogens. The non-health related occupations that reported significant numbers of exposures consisted of maids, police officers, firefighters, janitors and laborers, with the highest rate being 3.9 exposures per 1,000 equivalents (Chen & Jenkins, 2007).

**Bloodborne Pathogens Standards & Non-Compliance**

The Occupational Safety and Health Administration (OSHA) Bloodborne Pathogen Standard was introduced in 1992 with the objective of decreasing the risk of bloodborne pathogen exposures in health care workers. This standard covers the use and provision of personal protective equipment (i.e., gloves, face shields, etc.), communication about hazards, decontamination methods, and the implementation of universal precautions, which mandates to consider all blood and body fluids as contagious (Twitchell, 2003). The OSHA bloodborne pathogen standard was designed to be used across multiple occupations to decrease the potential risk of exposure.
Despite the length of time since this standard became law and the increasing number of resources available to facilitate implementation in the workplace, compliance has been shown to be inadequate, misunderstood, or not addressed at all (Dembski, 2011). Although OSHA does not inspect facilities on a frequent basis, it has the right to randomly inspect or directly inspect facilities as a result of a complaint, a serious injury, or death of an employee. If an organization is found to be non-compliant with one or more of the mandated standards, the organization is issued a fine according to the violation committed. Fines for noncompliance can be as high as $7,000, and fines for willful and repeated offenses can be as high as $70,000 per offense (Dembski, 2011). Employers must provide training for all employees and any staff members with risk of exposure to biohazards. The training must be annual, interactive, and geared to the trainees’ level of education and the type of hazards likely to occur in their workplace (Dembski, 2011; Lehman, Huy, Viet, & Gomaa, 2012). This study is concerned with employee non-compliance with bloodborne pathogen standards and focuses on addressing this issue within the campus recreation setting.

Campus Recreation

Collegiate or campus recreation programs first began during the 1860’s when two state schools, University of Michigan and Ohio State University, decided to provide resources and spaces devoted to student recreation. The rapid growth of student bodies on higher education institutions across the United States during the next few decades would then drive the creation and growth of recreation and intramural sports programs (NIRSA, 2008).
Between 2004 and 2009, an estimated $5 billion was spent across 700 indoor and outdoor recreation facilities in higher education institutions across the United States (Katz & Seifried, 2012). The availability of large and modern recreation facilities has become an influencing factor on student recruiting and retention. Institutions that renovate or build new recreation centers tend to experience higher student retention and increase new student enrollment rates (Kampf, 2010; Huesman Jr, Brow, Lee, Kellogg & Radcliff, 2009). Not only do recreation programs provide students opportunities for recreation, health and well-being, but is a significant source of employment for students looking for part-time jobs. In many campus recreation departments, students have become the main source of employment, taking on a variety of roles (Kampf & Teske, 2013; Mulrooney, Styles & Green, 2002).

Risk Management in Campus Recreation

The purpose of risk management is to reduce or eliminate the risk of injury or death that could result in serious injury, death, and/or litigation (Spengler, Connaughton & Pittman, 2006). Not having the proper risk management procedures could result in a negative reputation as well as a financial loss for the university. It is the duty of campus recreation programs to supervise, warn, instruct and provide patrons with protective equipment when necessary (Fields & Young, 2010; Katz & Seifried, 2012).

In 1990, a student at The University of Arizona suffered a heart attack while utilizing the recreation facilities. Employees at the recreation center called emergency medical services but failed to administer cardio-pulmonary resuscitation (CPR) while waiting for paramedics to arrive. The student suffered permanent brain damage due to the
lack of oxygen, resulting in a lawsuit against The University of Arizona where the jury ruled in favor of the student. The University of Arizona was deemed to pay $5 million to the student to pay for medical expenses and companion loss (McBride, 1996).

Due to the incident at the University of Arizona and the increase of student participation in recreation over the years, higher education institutions across the United States have given considerable attention to risk management protocols and practices. Many recreation administrators are trying to protect themselves from liability by issuing waiver forms, using Automated External Defibrillators (AED), and having Cardiopulmonary Resuscitation (CPR) and First Aid certifications for staff members (Lee, Farley & Kwon, 2010).

**Chapter 2 Summary**

Research on training programs continues to deliver new frameworks and guidelines to improve the development and evaluation of these programs. Current occupational health and safety training programs, particularly bloodborne pathogen programs, are not developed for specific occupations, which in some instances can pose a challenge for employees to retain knowledge and apply the training to their jobs. Like many other non-health related occupational settings, the collegiate recreation field introduces employees and participants to a potential risk of exposure to bloodborne pathogens for employees or participants. To ensure the safety of participants and avoid litigation, employees should receive adequate training programs to ensure they are capable of performing bloodborne pathogen related tasks and that they remain in compliance with current bloodborne pathogens standards.
CHAPTER 3

METHODS

This study used an embedded mixed methods design to examine how well student employees learn and retain information regarding bloodborne pathogens. This chapter includes the hypotheses, setting and participants, training program, instrumentation, data collection and procedures and methods of data analysis. Prior to employee training and data collection, approval was received from Clemson University Institutional Review Board (IRB2018-003).

Hypotheses

The hypotheses that guided this study were as follows:

1. Student employees that receive the advanced bloodborne pathogen training will have a significant improvement in posttest scores when compared to pretest scores.

2. Student employees that received the advanced bloodborne pathogen training retained knowledge gained during the training.

Setting and Participants

Through collaborations with Haley Cox, the Campus Recreation Associate Director of Operations, it was determined that all student staff employed as Operations Assistants, Lifeguards, and Climbing Wall Specialists (n=75) would benefit from receiving this specific training as part of their in-service training for the beginning of Spring 2018 semester (H. Cox, Personal Communication, July 21, 2017). With permission of IRB and the Campus Recreation directors, all student staff (Operations
Assistants, Lifeguards, Climbing Wall Specialists) were notified via-email of the on-going study during the in-service prior to the in-service date. The in-service took place in Fike Recreation Center at Clemson University. Although attendance to the in-service was mandatory, student employees that did not wish to participate in the study only received the BBP training but were not administered pre/post-tests. Because training was mandatory, the researcher was unable to randomly assign participants to a treatment and comparison group.

**Training Program**

Prior to this study, a blood/body fluid spill clean-up Standard Operation Procedure (SOP) was created specifically to fit the need of Clemson University Department of Campus Recreation (Appendix A). The researcher developed the standard operating procedure in collaboration with the Clemson University Department of Campus Recreation Assistant Director of Operations and the Clemson University Environmental Safety Program Manager. Because the Department of Environmental Health and Safety (EHS) did not have a specific format for this particular standard operating procedure, similar standard operating procedures’ available online from other higher education institutions were used as references during its development. After it was finalized, the standard operating procedure was reviewed and approved by EHS for the use of Clemson Campus Recreation.

The standard operating procedure instructs employees on the appropriate response and procedures during a blood or body fluid spill on the different surfaces in Clemson Campus Recreation facilities. Each surface has a specific procedure of cleaning, as some
(hardwood floors) cannot be disinfected with certain chemicals, while other surfaces
(grass fields) require a less rigorous clean-up process. In addition to specific surface
cleaning procedures, the standard operating procedure also addresses locations where
supplies can be found, and individuals who should be contacted when further assistance
is needed.

In addition, an advanced blood borne training program was developed to review
information covered in the OSHA bloodborne pathogen training, and to instruct student
staff how to properly generalize and apply blood/body fluid spill clean-up procedures to
the different surfaces throughout the facilities in Campus Recreation. The training
consisted of a slideshow presentation that included (a) a review of OSHA bloodborne
pathogen standards (bloodborne pathogen definition, personal protective equipment and
general spill clean-up procedure), (b) an introduction and description of the newly
developed blood/body fluid spill clean-up standard operating procedure, (c) a review of
communication procedures that should take place when a blood or body fluid spill is
reported, and (d) a review of the location and re-stocking procedures for BBP kits used
during blood or body fluid clean-up.

**Instrumentation**

Assessment instruments included a pretest, posttest and 8-week posttest.

Following the study by Einspruch et. al. (2007) which found that following a 2-month
period after receiving an online CPR training, knowledge, performance and skill declined
when compared to individuals who received the training in-person, it was determined that
an 8-week post-training period assessment would be accurate to evaluate learning retention.

The pretest and 8-week posttest were comprised of a total of 3 demographic questions, followed by 10 multiple-choice and short-answer questions focused around adequate blood/body-fluid clean-up procedures, locations of PPE and engineering controls in Fike Recreation Center (Appendix B). The posttest was comprised of the same questions as the pretest and 8-week posttest, with the addition of 2 open answer questions focused on learning experiences and changes in practice (Appendix C).

**Data Collection and Procedures**

The student staff In-service was scheduled at the beginning of the Spring 2018 semester. All current Operations Assistants, Lifeguards and, Climbing Wall Specialists were required to attend the training. The entire in-service lasted 4 hours, and it addressed different area updates and trainings. The advanced BBP training was delivered by the researcher on a 45-minute time block during the in-service. Prior to the distribution of pretests, the researcher read a consent script to all student staff members requesting their participation in the study. This included discussing the right to cease participation in the research at any point. Participation in the research portion of the program was voluntary and did not limit participation on the course.

After providing oral consent, all participants received the pretest instrument which took approximately 10 minutes to complete. When all participants had completed the pretest, the researcher delivered the 25-minute advanced BBP training. After the 25-minute training is completed, all participants received the posttest instrument to complete
in approximately 10 minutes. The researcher was available for any questions related to
the assessments throughout the testing and training. After 8 weeks from the in-service
date, student staff employed as Operations Assistants attended a 1-hour mid-semester in-
service in the month of March. Prior to the start of the in-service, the researcher read the
consent script and obtained oral consent from the participants. After consent was
obtained, participants completed the 8-week posttest in approximately 10 minutes.

Data Analysis

An embedded mixed methods design approach was used to support quantitative
findings with qualitative findings (Creswell & Creswell, 2017). A total of 75 participants
completed a pretest, received the training and completed a posttest during the first In-
Service. The pretest and posttests were scored on a scale of 0-10 and the scores were
inputted on a spreadsheet. Because only students employed as Operations Assistants
attended the second In-Service that was scheduled 8-weeks after the initial data
collection, a total of 45 (60% response rate) 8-week posttest were collected, scored and
inputted on the spreadsheet. All quantitative data was analyzed using JMP Pro 13.

Prior to hypothesis testing, frequency and standard deviation were computed for
all demographic variables (e.g., gender, class, and semester starting to work for Campus
Recreation). For the purpose of this study, two different statistical analysis were used. A
paired T-test analysis was used to compare pre and posttest scores obtained by the 75
participants that received the training. The second statistical analysis utilized was a
repeated measures ANOVA to test for increase of knowledge and retention of knowledge
throughout the study. This analysis was performed using the scores obtained by students
employed as Operations Assistants (n=45) on the pretest, posttest and 8-week test. A repeated measures ANOVA was selected given that in this type of analysis a variable (i.e. test scores) is measured several times to determine a specific outcome change over time (Huck & McLean, 1975).

Because results from the quantitative analysis cannot assess employee generalization of training, an embedded mixed methods analysis was used to determine whether employees were able to generalize the knowledge acquired from the training (Creswell & Creswell, 2017). Qualitative data were collected from the open-ended questions answered on the posttest. A deductive content analysis approach was chosen to analyze the data, since this particular analysis focuses on identifiable themes and patterns of living and/or behavior and facilitates the understanding of ideas emerging from the data (Aronson, 1995). All of the answers provided in the two open-ended questions in the posttest were analyzed by familiarization of data, generation of initial codes through open coding, creation of themes from the codes, revision of themes, definition of themes, and finalized reporting (Braun & Clarke, 2006). To enhance validity of the data, an external auditor reviewed all codes and themes (Creswell & Creswell 2017). Developed themes focused around new information learned during the training and changes in practice, to support the conditions of learning and generalization of the material learned (Baldwin & Ford, 1998; Kirkpatrick, 1967). Additionally, within these themes, quotes from individual responses were formed to support findings.
CHAPTER 4
RESEARCH FINDINGS

Chapter 4 describes the findings of the study, including the demographic information about the participants and the results of the quantitative and qualitative data analysis.

Demographics

The three student employee positions that participated in this study consisted of Climbing Wall Specialists, Lifeguards, and Operations Assistants. A total of 75 student employees received the training program. Demographic data for the study participants can be found in table 4.1. There were 42 female participants (56%) and 33 male participants (44%).

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
<td>56%</td>
</tr>
<tr>
<td>Male</td>
<td>33</td>
<td>44%</td>
</tr>
<tr>
<td>Semester starting to work for Campus Recreation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring 2018</td>
<td>33</td>
<td>44%</td>
</tr>
<tr>
<td>Summer/Fall 2017</td>
<td>22</td>
<td>29.33%</td>
</tr>
<tr>
<td>Spring 2017</td>
<td>11</td>
<td>14.67%</td>
</tr>
<tr>
<td>Before Spring 2017</td>
<td>9</td>
<td>12%</td>
</tr>
<tr>
<td>Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>12</td>
<td>16%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>16</td>
<td>21.33%</td>
</tr>
<tr>
<td>Junior</td>
<td>26</td>
<td>34.67%</td>
</tr>
<tr>
<td>Senior</td>
<td>15</td>
<td>20%</td>
</tr>
<tr>
<td>Graduate</td>
<td>6</td>
<td>8%</td>
</tr>
</tbody>
</table>

Table 4.1: Demographic Information of Participants

The majority of participants (44%) began working for the Department of Campus Recreation during the Spring 2018 semester, with a total of 33 employees. Most
participants tended to be juniors (34.67%), with sophomores (21.33%), seniors (20%), freshman (16%) and graduate students (8%) following respectively.

**Quantitative Results**

*Paired Sample T-test*

A paired-samples t-test was conducted to compare participants pre and posttest scores obtained on the assessment during the first in-service (n=75). There was a significant difference in the pretest scores (M=6.20, SD=0.9359) and posttest (M=8.77, SD=0.6158); t(74)= 1.87, p < 0.0001. Because these results indicate an increase in scores, the first hypothesis: “student employees that receive the advanced bloodborne pathogen training have higher scores on the posttest” is accepted. Specifically, these results suggest that there was an increase in knowledge after receiving the advanced BBP training.

*Repeated Measures ANOVA*

A one-way repeated measures ANOVA was conducted to compare the effects of training on the pretest, posttest, and 8-week posttest scores (n=45). There was a significant effect of training on test scores, F (2, 44)= 290.44, p < 0.001. These results suggest that there was learning, and retention of knowledge obtained from the advanced BBP training over time (Figure 2).

Because the results of the one-way repeated measures ANOVA were statistically significant three paired samples t-tests were used to make post hoc comparisons between tests scores. The first paired samples t-test indicated that there was a significant difference between the pretest scores (M=6.06, SD=0.9545) and posttest scores (M=8.73, SD=0.1767); t(44)= 23.64, p < 0.001. A second paired samples t-test indicated that there
was a significant difference between the posttest scores (M=8.73, SD=0.1767) and 8-week posttest scores (M=7.82, SD=0.2474); t(44)= -7.55, p < 0.001. This particular paired t-test yields a negative value, which indicates a significant decrease in scores obtained during the post-test and the 8-week posttest. The third paired samples t-test indicated that there was a significant difference between the pretest scores (M=6.06, SD=0.9545) and 8-week posttest (M=7.82, SD=0.2474); t(44)= 14.62, p < 0.001. While there was a significant decrease between the mean posttest scores and the mean 8-week posttest scores, the mean 8-week posttest scores still remained higher than the mean pretest scores. This indicates potential retention of knowledge acquired from the advanced BBP training. The second hypothesis: “student employees that received the advanced bloodborne pathogen training retained knowledge gained during the training” is also accepted.

![Advanced BBP Training Test Scores](image)

*Figure 4.1: Advanced BBP Training Scores Mean Comparison Graph*
Qualitative Results

Deductive open coding was used to create themes by exploring participants responses to questions related to the concepts of learning, retention and generalization (Baldwin & Ford, 1998; Kirkpatrick 1967). A total of 75 participants responded to at least one of the two open-ended questions on the posttest. Findings revealed three different themes supporting the concepts of learning and changes in practice after participating in the training. These themes are increased awareness, response improvements, and safety practices. Additional quotes coded during the analysis and assigned to themes can be found on table 4.2.

Increased Awareness

For the majority of individuals, receiving the training was a positive influence on increasing their overall awareness regarding safety and procedures. A number of participants reported becoming aware of the different procedures specific for each surface within the Campus Recreation Facility. One participant wrote,

“I had never thought of the possibility of a blood incident occurring on a machine, now I know that it requires a very delicate clean-up procedure”

In addition, some participants also reported increasing their awareness regarding the locations of materials used during a blood or body-fluid spill incident, such as clean-up kit location, and the location of the biohazard disposal containers. Participants also reported becoming aware of the different materials available for use to facilitate and ensure a safe clean-up process. An employee stated, “There are a number of different chemicals used within the facility which makes it difficult to know what to use. After the training I know that RedZ® and Sanizide® are used during blood cleaning”
### Table 4.2: Summary of Themes and Coded Samples

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sample from coded text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased Awareness of blood and body-fluid clean-up procedures</td>
<td>“You can’t use the same cleaning process on the gym courts on Mondo or tile”</td>
</tr>
<tr>
<td></td>
<td>“I learned where the BBP Kits are located and what’s in them”</td>
</tr>
<tr>
<td></td>
<td>“The kits should be re-stocked after every use, and the materials are available at the front desk”</td>
</tr>
<tr>
<td></td>
<td>“I’ll use the solidifying material makes cleaning the blood easier and faster”</td>
</tr>
<tr>
<td>Blood or body-fluid spill response improvements</td>
<td>“Making sure I leave the disinfectant for the right amount of time instead of wiping it off right away”</td>
</tr>
<tr>
<td></td>
<td>“Gloves should be worn at all times, even during disposal of the hazardous trash”</td>
</tr>
<tr>
<td>Safety Practices during a blood or body-fluid spill clean-up procedure</td>
<td>“Blood spills should be cleaned with disposable towels to avoid having to throw away the re-usable towels”</td>
</tr>
<tr>
<td></td>
<td>“I will make sure to report the incident to my supervisor to make sure there is adequate follow-up if needed”</td>
</tr>
</tbody>
</table>

**Response Improvement**

A large number of participants reported that they were going to improve or adjust their response to a blood or body fluid incident after receiving the training. Approximately 39 employees reported they would follow the new standard operating
procedure to adequately clean a spill incident. One particular participant said, “Having
the instruction sheet available in the kits will help me make sure I’m following the
adequate steps for a specific area”. Other employees answered that they would
adequately report the incident or contact the appropriate staff member to request for
further assistance. A participant stated, “I learned I have to contact my supervisors to
disassemble equipment if blood or something else gets in it”.

Safety Practices

Practicing the different safety measures during a clean-up was another prominent
theme amongst participant responses. A total of 12 employees mentioned the importance
of wearing gloves during spill clean-up, while 21 employees referenced to the use of
disposable paper towels rather than re-usable towels. A participant shared, “I will not use
the blue re-usable towels, and if I do, I will not place them on the laundry basket with the
rest of the towels. All the towels with blood should go on the biohazard trash”. Moreover,
15 participants mentioned learning about emergency procedures in case of coming in
contact with any hazardous material. One participant explained, “I usually work the late-
night shifts and full-time staff has left for the day, so I learned that if I am exposed to
blood or something hazardous I need to call Corvel to follow the workers comp process”.

Summary of Results

The initial comparison for all collected pre and posttest data during the first In-
service showed a statistically significant increase in learning, which was further
supported by the answers provided in the open-ended questions of the posttest. In
addition, the analysis of variances performed on the scores obtained for pretest, posttest
and 8-week posttest indicated a statistically significant increase in learning in addition to a statistically significant retention of knowledge obtained from the training. The themes that emerged from the open coding were response improvement, increased awareness and safety practices. Through these themes, employees successfully reported various methods of generalization, by applying the newly acquired knowledge to future practice changes.
CHAPTER 5: 
DISCUSSION

The purpose of this study was to determine the impact of an advanced BBP training program developed to meet the needs of the Clemson University Department of Campus Recreation and its student staff. Data were collected through the use of pre, post, and 8-week posttest measures to assess the effectiveness of the advanced BBP training. This chapter includes the discussion of findings, implications, and limitations, and offers recommendations for future research.

Discussion of Findings

The bloodborne pathogen training program used for this study did not require the development of a new training, but rather, the customization of an already existing training program (OSHA bloodborne pathogen training) to address the needs of the Clemson Campus Recreation employees. In doing so, this study aims to serve as a framework for other organizations where employees fail to learn or apply a training program to their occupations.

This study provides support for the importance of implementing training programs that are customized to address the needs of a specific organization or occupation, and that doing so positively impacts the knowledge of employees (Burke & Hutchins, 2007; Williams et al. 2010). This support reflects on the significant difference from the initial comparison between participant’s pre- and posttest scores. Findings from this study are similar to those of Williamson et. al (2010) where the customizing of existing occupational health and safety training program to fit a targeted population
resulted in an increase in occupational safety knowledge and self-protective behaviors and attitudes. These findings address research question #2: To what extent will the advanced bloodborne pathogen training (BBP) impact employees’ knowledge about BBP and practices associated with blood/body fluid spill clean-up procedures?

Subsequently, statistical comparison between the scores of participants who completed the pretest, posttest and 8-week posttest also yielded a significant difference. Although post hoc testing between posttest and 8-week posted resulted in a negative value, the aim of this study was not focused on a continuous increase of knowledge in participants, but rather a retention of the knowledge gained from the in-service, which is potentially indicated by the statistical significance between pre-test scores and 8-week posttest scores. Retention is an essential aspect of training to the transfer of training process, if a training program does not accomplish retention, it is unlikely that the transfer of training process will be completed, making that training program less valuable and unlikely to be used by employers (Baldwin & Ford, 1998; Grossman & Salas, 2011).

The deductive coding from the open-ended questions revealed three major themes: increase awareness, response improvement and safety practices. All three themes indicated that employees had learned new information regarding Bloodborne Pathogens and adequate procedures that were not learned during the OSHA Bloodborne Pathogen training. These findings address research question #3: To what extent will employees change blood/body fluid spill incident response practices after completing this training? Moreover, these themes indicated that employees were able to generalize information from the advanced BBP training by providing different application methods of the
information learned during the training to their job duties. According to Grossman & Salas (2011) for training to successfully transfer, trainees need the resources and opportunities to apply their new skills and abilities to their workplace and specific duties.

The embedding of qualitative results to quantitative results address research question #1: Could the development of a BBP training program that is more applicable to a specific occupation or setting benefit the learning, retention and generalization of information learned from the OSHA BBP training program? Findings from quantitative and qualitative results indicate that participants acquired and retained knowledge from the bloodborne pathogen training program. Employees were then able to provide generalization methods of the material learned through short answers.

**Implications**

Employees are a fundamental part of any organization, and if their performance is not highly effective, the whole company is negatively affected (Grossman & Salas, 2011). When employees perform better, the organization ultimately performs better (Jehanzeb & Banshir, 2013). Specifically, an effective health and safety training reduces injuries or hazards within the organization, which reduces the costs of workplace incidents on the organization (Dembski, 2011; Lehman, Huy, Viet, & Gomaa, 2012).

Prior to this study, participants had only received the online OSHA Bloodborne Pathogens training, as it is required for any Clemson Campus Recreation student employee to complete the training prior to starting their job duties. The OSHA training program for Bloodborne Pathogens is designed to be used by a number of different employers in a wide range of occupational settings across the United States, therefore
making the training less contextual. In addition, there is very limited research on the effectiveness of this particular training. Reports of inadequate responses to blood or body-fluid spill incidents and low-scores on the pretest, which included questions similar to those asked during the OSHA training, are possible indicators that employees do not retain information provided on the training and have difficulty generalizing and applying the information to their specific job duties (Baldwing & Ford, 1998; Kirkpatrick 1967).

The results of this study can serve to support the idea that organizations should continuously invest in training opportunities for their employees. More importantly, these training opportunities should be meaningful, relevant, and easily transferable to their specific jobs, in order for employees to be invested on the training program (Williams, Ochsner, Marshall, Kimmel & Martino, 2010). For this particular study, the Clemson University Department of Campus Recreation should consider the implementation of this training program into future student staff In-services to decrease any hazards for both student employees and patrons utilizing the facilities.

Moreover, this study supports the importance of employers investing on relevant training programs for their employees, given that the cost of a potential injury or lawsuit due to employee negligence heavily outweighs the cost of providing health and safety trainings for employees. The cost of employee injuries in the workplace averages to $27,000, while costs of lawsuits against an organization due to injury or death can easily surpass $1 million (Waehrer, Dong, Miller, Haile & Men; 2007). It is estimated that in the United States employers pay $1 billion per week due to employee injuries (OSHA, 2017). Meanwhile, the cost of this particular training, taking into consideration employee
wages, cost of materials, and use of space, estimated to $1,200. Other training programs may have a higher cost, but that cost is unlikely to compare to that of injury compensation or a lawsuit (Burke, Sarpy, Smith-Crowe, Salvador & Islam; 2006).

Limitations

A few study limitations are acknowledged. First and foremost, this study is focused on one particular employer and employees (Clemson University Campus Recreation and student staff). Other recreation departments may have procedures that are significantly different that those used in this study as well as different occupations having different needs to be addressed. In addition, due to time constraints on the researcher and the participants, this research study did not assess all of training inputs on the transfer of training model, such as trainee characteristics (i.e. personality, motivation) (Baldwin & Ford, 1998). Research has found that trainee characteristics play a powerful role in the transfer of training (Burke & Hutchins, 2007; Grossman & Salas, 2011). Moreover, this study does not assess the maintenance condition of transfer (Baldwin & Ford, 1998) or Kirkpatrick’s impact component, since this would require the observation or evaluation of an employee responding to a blood or body-fluid spill incident, which occur randomly and without the guarantee of the researcher being present.

Lastly, participants were not randomly assigned to the training, since it was determined that all student staff attending the In-service would receive this training. The analysis of non-random data may lead to faulty inferences about the data (Goodman & Blum, 1996).
Future Research

Although the results of the study support the implementation of a training program that is tailored to a specific occupation or setting, the fact that significant declines occur after only 8-weeks months after training suggest that there is still considerable work to be done in training design and implementation to foster improved immediate and longer-term performance. Future studies should assess the needs of similar training programs within the context of non-health related and parks and recreation occupations, since a significant number of these occupations also have potentials for risk. Because this study was focused on one particular occupation and setting a future research study may attempt to develop a program that can be applied to a number of occupations and evaluate the effectiveness across these occupations. It is important for future researchers to assess the maintenance (Baldwin & Ford, 1998) and impact (Kirkpatrick, 1967) of training through employee observations or skill evaluations in the workplace.

Summary

This study provides insight into the benefits of developing and implementing health and safety training programs for non-health related occupations such as campus recreation positions. Training programs that include relevant content facilitates the learning process as well as the ability of employees to generalize and apply the knowledge to their jobs. Future research of training programs should take into consideration all training inputs from the transfer of training model (Baldwin & Ford,
1998) as well as focus on the impact and results that a training program has on long term employee behaviors and practice.
APPENDICES
Appendix A

Clemson Campus Recreation Blood/Body-fluid Clean-up Standard Operating Procedure

BLOODBORNE PATHOGENS | INFECTIOUS MATERIAL CLEAN-UP
STANDARD OPERATING PROCEDURE

This document lists the Universal Precautions, Personal Protective Equipment (PPE), Standard Operating Procedures to reduce the risk of Bloodborne Pathogens Exposure.

1. Universal Precautions

   Universal Precautions is an approach to infection control to prevent contact with blood or other "potentially infectious materials" (PIM). PIM includes the following human bodily fluids: blood, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any bodily fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids. PPE should be worn at all times when it is expected you may come in contact with blood or PIM.

2. Personal Protective Equipment

   PPE is specialized clothing or equipment utilized for protection against hazards. General work clothes (e.g., uniforms, pants, shirts or blouses) are not intended to function as protection against hazards and are not considered to be PPE. If a garment is contaminated with blood or PIM, it must be removed immediately.

   The Occupational Health and Safety Administration (OSHA) requires employers to supply PPE.

3. S.O.P for Campus Recreation Staff

   Staff members responding to a BBP spill must be OSHA BBP certified.

   Please refer to the "Surface Specific Procedures" to determine the appropriate steps to clean a spill depending on the location and surface.

   All surfaces will require the use of a "BBP Clean-Up Kit". If assistance is needed because the spill is unusually large, it involves additional hazards, or clean-up materials are not available, contact the University's Office of Environmental Health and Safety at (864) 656-3311.

   a. Materials Available in BBP Clean-Up Kit:
      i. Instruction Sheet
      ii. Disposable Vinyl Gloves
      iii. Disposable Apron
      iv. Disposable Dustpan
      v. Safety goggles
      vi. Labeled Red Biohazard Bags
      vii. 5 oz. Safetec RedZ Fluid Solidifier
      viii. 16 oz. Safetec Sanizide Germicidal Solution

Clemson University Campus Recreation 2017
b. After Clean-Up
Hands should be washed immediately or as soon as possible after removal of gloves or other personal protective equipment. Use a utility or restroom sink for hand washing – do NOT use sinks in food preparation areas. If hand washing facilities are not immediately available use antiseptic hand cleanser and/or disposable wipes and wash your hands as soon as a hand washing facility becomes available.

After clean-up is complete and all contaminated materials have been placed on a biohazard bag, bag should be securely closed with a twist tie to prevent leakage. DO NOT throw untreated biohazard waste in the regular trash. Biohazard bags should be disposed in a red Biohazard container located in Fike Laundry Room or Fike Athletic Training Room or in the CORE storage barn.

C. Surface Specific Procedures
The department of Campus Recreation encompasses multiple facilities throughout the Clemson University campus. All facilities consist of a variety of surfaces, ranging from hardwood floors to artificial turf. PPE SHOULD BE WORN AT ALL TIMES FOR ALL CLEAN UPS. The decontamination and proper cleaning of BBP spill of the different surfaces are specified in the sections below.

Clemson University Campus Recreation
2017
1. Close off area to traffic & notify Recreation Supervisor, other staff, and patrons of spill.
2. Retrieve or have someone bring BBP Clean-Up Kit to location.
3. Put on appropriate PPE (personal protective equipment):
   - Disposable gloves – always
   - Disposable facemask and shield – as needed
   - Disposable apron – as needed
4. Determine if spill is small, medium, or too large for provided clean up materials.
   a. If a smaller spill (i.e. blood droplets), use paper towel first to wipe up.
   b. If a medium spill (i.e. puddle of blood or vomit), cover the entire spill with Safetec® RedZ® Fluid Solidifier.
      1. After the spill solidifies (1-2 minutes), use the disposable scoop/scrapper to pick up material and put into red Biohazard Bag and tie shut. Keep Personal Protection Equipment on.
5. Spray the area with Safetec® SaniZide® and allow proper contact time (5 Minutes) prior to wiping with paper towel.
   a. Paper towels can be found in the GCA closet located in the first floor of Fike Recreation center or in the bathroom storage area in the CORE Office. **DO NOT CLEAN WITH RE-USABLE TOWELS**
6. Dispose of contaminated paper towel in biohazard bag.
7. Remove pair or gloves and dispose in biohazard bag.
8. Close the bag and dispose of biohazardous waste in labeled Biohazard containers located in Fike Laundry Room, Physical Therapy Office, or CORE storage barn.
9. Wash hands with soap and water.
10. Replenish the spill kit with supplies from UPTSM Room and return the kit to designated location.
11. Inform Recreation Supervisor that spill clean-up is complete and area has been disinfected.

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1. Close off area to traffic & notify Recreation Supervisor, other staff, and patrons of spill.
2. Retrieve or have someone bring BBP Clean-Up Kit to location.
3. Put on appropriate PPE (personal protective equipment):
   - Disposable gloves – always
   - Disposable facemask and shield – as needed
   - Disposable apron – as needed
4. Determine if spill is small, medium, or too large for provided clean up materials.
   a. If a smaller spill (i.e., blood droplets), use paper towel first to wipe up.
   b. If a medium spill (i.e., puddle of blood or vomit), cover the entire spill with
      Safetec® RedZ® Fluid Solidifier.
      i. After the spill solidifies (1-2 minutes), use the disposable scoop/scrapers to
         pick up material and put into red Biohazard Bag and tie shut. **Keep
         Personal Protection Equipment on.**
5. Spray the area with Safetec® Sanitizer and allow proper contact time (5 Minutes)
   prior to wiping with paper towel.
   a. Paper towels can be found in the GCA closet located in the first floor of Fike
      Recreation center or in the bathroom storage area in the CORE Office. **DO
      NOT CLEAN WITH RE-USABLE TOWELS**
6. If BBP may be present on inside of machine:
   a. Report to Jimmy Mullinax (mullin6@clemson.edu) for maintenance team to
      immediate follow up.
   b. Use caution tape and “Equipment not safe for use” sign located in the BBP kit to
      close off machine to patrons.
7. Dispose of contaminated paper towel in red biohazard bag.
8. Remove pair of gloves and dispose in red biohazard bag.
9. Close the bag and dispose of biohazardous waste in labeled Biohazard containers
   located in Fike Laundry Room.
10. Wash hands with soap and water.
11. Replenish the spill kit with supplies from UPTSM Room and return the kit to designated
    location.
12. Inform Recreation Supervisor that spill clean-up is complete and area has been
    disinfected.
1. Close off area to traffic & notify Recreation Supervisor, other staff, and patrons of spill.
2. Retrieve or have someone bring BBP Clean-Up Kit to location.
3. Put on appropriate PPE (personal protective equipment):
   - Disposable gloves – always
   - Disposable facemask and shield – as needed
   - Disposable apron – as needed
4. Cover the entire spill with disposable absorbent paper towels.
   a. Paper towels can be found in the GCA closet located in the first floor of Fike Recreation center or in the bathroom storage area in the CORE Office. **DO NOT CLEAN WITH RE-USABLE TOWELS**
5. Spray the area with Safetec® SaniZide® and allow proper contact time (5 Minutes) prior to removing with paper towel.
   a. Additional steam cleaning may be necessary to assure disinfection and to avoid discoloring the surface. Email Jimmy Mullinax (mullin6@clemson.edu) to schedule carpet cleaning with GCA or Snow maintenance team.
6. Dispose of contaminated paper towel in red biohazard bag.
7. Remove pair of gloves and dispose in red biohazard bag.
8. Close the bag and dispose of biohazardous waste in labeled Biohazard containers located in Fike Laundry Room Physical Therapy Office, or CORE storage barn.
9. Wash hands with soap and water.
10. Replenish the spill kit with supplies from UPTSM Room and return the kit to designated location.
11. Inform Recreation Supervisor that spill clean-up is complete and area has been disinfected.
1. Close off area to traffic & notify Recreation Supervisor, other staff, and patrons of spill.
2. Retrieve or have someone bring BBP Clean-Up Kit to location.
3. Put on appropriate PPE (personal protective equipment):
   - Disposable gloves – always
   - Disposable facemask and shield – as needed
   - Disposable apron – as needed
4. Flush the spill area with water. **Keep Personal Protection Equipment on.**
5. Spray the area with Safetec® SaniZide® and allow proper contact time (5 Minutes).
6. Remove pair of gloves and dispose in red biohazard bag.
7. Close the bag and dispose of biohazardous waste in labeled Biohazard containers located in Fike Laundry Room or CORE storage barn.
8. Wash hands with soap and water.
9. Replenish the spill kit with supplies from UPTSM Room and return the kit to designated location.
10. Inform Recreation Supervisor that spill clean-up is complete and area has been disinfected.
Appendix B

Clemson University Department of Campus Recreation

Advanced Bloodborne Pathogen Assessment

Name:

Please answer all the questions below.

1. Which of the following do you identify as?
   a) Male
   b) Female
   c) Transgender
   d) Do not identify as female, male, or transgender

2. How long have you been working for Clemson University Campus Recreation?
   a) Less than 6 months
   b) 6-12 months
   c) 13-17 months
   d) More than 17 months

3. What is your class?
   a) Freshman
   b) Sophomore
   c) Junior
   d) Senior

The following questions relate to the Occupational Health and Safety Administration (OSHA) bloodborne pathogen standards and the Standard Operating Procedure (SOP) for blood/body-fluid clean-up.

4. According to OSHA, what are Universal Precautions?
   a) Detecting and removing any items that may harm a person.
   b) Treating all human blood and body fluids as is they were infected.
   c) Cleaning all equipment and surfaces after they have been used.
   d) All of the above.

5. What commercial disinfectant is used to clean a surface after blood or body-fluid has been removed?
   a) Clorox®
   b) Microban®
   c) Lysol®
   d) SaniZide®
6. Where in Fike Recreation Center are the BBP Kits located?

7. If available, what should be used to facilitate cleaning a large amount of blood or body-fluid?
   a) Hydrogen Peroxide
   b) Liquid Solidifier Material
   c) Bleach
   d) Disposable Towels

8. List THREE different personal protective equipment items present on a Bloodborne pathogen kit:
   -
   -
   -

9. You respond to a call where a patron felt nauseous while running on a treadmill and vomited, the patron has been assisted, but there is a significant amount of vomit on the equipment. Which of the following steps should you follow: (CHECK ALL THAT APPLY)
   a) Make equipment unavailable for patrons
   b) Apply liquid solidifying material on the equipment
   c) Use a towel to wipe the blood from the equipment
   d) Spray the equipment with commercial disinfectant

10. What are the two locations for Biohazard Trash disposal in Fike Recreation Center?
    -
    -

11. List TWO differences between cleaning a blood or body-fluid spill located on a carpet surface, versus one located on tile surface:
    -
    -

12. While cleaning up a blood spill from a patient with a nosebleed, you notice some blood on your wrist. What is the order of steps you should follow after the incident?
    - Report to supervisor and write an incident report
    - Wipe blood with a towel
    - Follow up with a physician
    - Wash hands with soap and water
REFERENCES


Clemson Department of Campus Recreation. (2016). *Campus Recreation Annual Internal Reports*. Available from Clemson University Department of Campus Recreation.


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