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Status of the implementation of automated external defibrillators in South Korean health/fitness facilities

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STATUS OF THE IMPLEMENTATION OF AUTOMATED EXTERNAL DEFIBRILLATORS IN SOUTH KOREAN HEALTH/FITNESS FACILITIES

by

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ABSTRACT

The purpose of this study was to investigate the status of automated external defibrillator (AED) implementation in South Korean health/fitness facilities; for facilities with AEDs, to investigate risk management practices associated with AED implementation; and for facilities without AEDs, to investigate constraints to AED implementation. A questionnaire measuring the status of AED implementation, risk management practices for facilities with an AED(s), and constraints to AED implementation was developed and administered to 436 health/fitness facility managers in South Korea. The participants were selected by using random sampling with stratified populations. Results showed that the status of AED implementation in South Korean health/fitness facilities was only 8.7% (38 of 436). The distribution of AEDs by location and ownership was uneven. The level of manager's knowledge of AED laws was also low. With regard to risk management practices, about 65% of the managers responded that there was one or more staff members trained to use an AED(s). However, less than 5%

(17 of 436) health/fitness facilities were ready to provide defibrillation with an AED by an on-duty trained staff member in an emergency situation. Results of the factor analysis generated a five factor model for perceived constraints to AED implementation including Cost, No Need, Lack of Support, Lack of Information, and Management Concerns. The study elicited the following five managerial constraints to AED implementation: (1) Lack of information associated with required AED certification and training; (2) Lack of an AED instructor; (3) Lack of information regarding supervisory responsibility; (4) Lack of information associated with protection from liability; and (5) Additional staff certification and training. The findings of this study contribute to the body of knowledge on AED implementation in South Korean sport venues in general, and health/fitness facilities specifically. An overall result from this study showed that health/fitness facility managers tend to diminish the probability of a sudden cardiac arrest (SCA) and the need for AED implementation in their facilities. The study may contribute to an increase in overall AED implementation in South Korean health/fitness facilities via facility managers' increased attention to the use of AEDs and the potential for SCA. In the future, the enactment of additional AED regulatory laws in sport venues will also contribute to an increase in AED implementation in South Korean sport facilities.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Sudden cardiac arrest (SCA), a medical emergency, signifies the cessation of a heartbeat and breathing, and loss of consciousness (LifeBeat, 2011). In the United States, more than 300,000 persons suffer SCA each year (American Heart Association [AHA], 2011a), and approximately 33% of all American adults, nearly 105 million, are suffering from a cardiovascular disease (AHA, 2011b). Research shows that SCA is also a significant health problem in developed European and Asian countries (Bahr et al., 2010; Cho, 2011; Lippert, Raffay, Georgiou, Steen, & Bossaert, 2010).

The irregular heartbeat, referred to as ventricular fibrillation (VF), and a fast heart rate, referred to as ventricular tachycardia (VT), are among the main contributors to SCA and sudden cardiac death (SCD) (Sekendiz & Quick, 2011). The Mayo Clinic (2011) defined VF as a chaotic heart rhythm, with fast and inconsistent electrical impulses, which causes abnormal blood pumping to interrupt the blood supply to essential organs. The condition results in poor blood circulation and SCA within minutes (Fogoros, 2011). Applying cardiopulmonary resuscitation (CPR) and electric shock with a defibrillator, which uses electricity to stimulate the heart and return it to its normal rhythm, are regarded as effective emergency treatments for VF (Mayo Clinic, 2011). Without immediate treatment of CPR and defibrillation, VF leads to SCA. Since the chance of survival from VF decreases by 7% to 10% each minute after unconsciousness, high survival rates are typically only found when the time from collapse to defibrillation is short (LifeBeat, 2011).

The use of a computerized device, known as an automated external defibrillator (AED) that delivers an electrical shock to victims of VF SCA, has contributed to increased survival rates of SCA victims (Korean Association of Cardiopulmonary Resuscitation [KACPR], 2011). AEDs allow laypersons to resuscitate SCA victims by attaching adhesive pads to a victim's chest wall while following voice instructions (National Center for Early Defibrillation [NCED], 2011a). The AED uses a computer to analyze the victim's heart rhythm and will stop the victim from being shocked if it is not necessary (NCED, 2011a). When it is necessary, the AED will prompt the rescuer to deliver an electrical shock, as described above, in an effort to revive the victim.

According to current European Resuscitation Council Guidelines (European Resuscitation Council, [ERC], 2010), the use of AEDs must be considered an integral unit of basic life support. The increased number of accessible AEDs in public settings, including airports, shopping malls, schools, and sport arenas, has led to significant increases in survival rates. For example, a study on AED effectiveness in U.S. high schools found that of the 36 SCA cases, 30 (83%) victims received AED treatment, and 22 (64%) of the cardiac arrest victims survived (Drezner, Rao, Heistand, Bloomingdale, & Harmon, 2009). It was a remarkable improvement compared to a previous seven-year study for youth that reported an 11% survival rate in the United States (Drezner, Chun, Harmon, & Derminer, 2008).

The results of previous studies found similarities related to the physiological conditions of SCA victims. The National Center for Early Defibrillation (NCED) has classified the patients who have one or more of the following conditions as a "high risk" group (NCED, 2011b):

- Men age 40 or older
- Post-menopausal women
- People with high blood pressure
- People with high cholesterol
- People with a sedentary lifestyle
- People with diabetes
- People with a personal history of heart disease
- People with a family history of heart disease

In addition, obesity, smoking, and excessive alcohol consumption are risk factors to SCA (LifeBeat, 2011). Recent research has indicated that many SCD cases have occurred among professional athletes, collegiate athletes, and teenagers with healthy hearts (Corrado, Basso, Schiavon, Pelliccia, & Thiene, 2008; Drezner, 2009). SCA cases can occur at sport venues, including health/fitness clubs, aquatics, sport arenas, and golf courses (Spengler, Connaughton, & Pittman, 2006). The results of Drezner, Asif, and Harmon's (2011) study further support that health/fitness facilities are increasingly recognized as higher risk locations that may benefit from the implementation of AEDs.

To address SCA issues throughout the 50 states at agency levels, Congress has introduced specific bills governing the location and use of AEDs. California, Illinois, Indiana, Massachusetts, Michigan, and New York have passed legislation requiring health and fitness centers to have at least one AED on the premises (American College of Sports Medicine [ACSM], 2011). The AED legislation in Illinois, New York, and Oregon is specific to the size of the health/fitness facility (ACSM, 2011). For example, New York requires that AEDs be placed in all health/fitness facilities with more than 500

members (NY Gen. Bus. §627-a). In 2002, the ACSM and the AHA issued a joint recommendation on AED placement in health clubs. The ACSM and the AHA strongly encourage placement of AEDs in all health and fitness clubs and suggested that "AEDs in a facility shall be located within a 1.5 minute walk to any place an AED could be potentially needed" (ACSM, 2011, p. 24).

Statement of the Problem

The South Korean government amended the Emergency Medical Service Act in 2008. During the revision of the Emergency Medical Service Act, several subparagraphs regarding AED implementation were inserted and proclaimed. In August, 2011, another amendment to the Emergency Medical Service Act was designed to supplement subparagraphs regarding AED and public access defibrillation (PAD) implementation. In the 2011 revision, laws related to the Good Samaritan Act, Article 5-2, and Article 63 of the South Korean Emergency Medical Service Act stated that even though an AED is a medical device, it can be used by laypersons trained to use it in a medical emergency (KACPR, 2011).

Recently, SCA victims in South Korean sport settings have survived cardiac arrests due to an effective AED program (Woo, 2011). As mentioned earlier, a health/fitness facility is one of the most likely public places where patrons can suffer a SCA. Thus, AED programs in health/fitness facility settings are needed to help save the lives of SCA victims. Currently, however, legislation and guidelines do not exist in South Korea specifically recommending the use of AEDs in health/fitness facilities.

Purpose of the Study

The primary purpose of this dissertation was (1) to investigate the status of automated external defibrillator (AED) implementation in South Korean health/fitness facilities; (2) for facilities with AEDs, to investigate risk management practices associated with AED implementation; and (3) for facilities without AEDs, to investigate constraints to AED implementation. Additional research questions included the following: the managers' knowledge of AED legislation, management plans, and responsibilities for the programs. The researcher also examined how facilities were involved in pre-participation screening of the members for information regarding cardiac issues that may increase one's chances of suffering a SCA.

Significance of the Study

The benefits of this study were the identification of the current extent of AED implementation in the South Korean health/fitness industry. Recognition of why facilities failed to implement an AED was also important. If cost was the major concern for the failure to have an AED in place then local governments should be encouraged to fund such programs. In addition, as a result of this study, managers may become aware of the seriousness of SCA cases in health/fitness facilities and decide to provide AEDs in their facilities. Future victims of SCA will therefore have a greater chance of survival. Consequently, it is hoped that the results of this study will contribute to the existing literature and will encourage new AED legislation.

Research Questions

To achieve the purpose of this study, the primary research questions were as follows:

(1) What is the status of AED implementation in South Korean health/fitness facilities?

(2) For facilities with AEDs, what risk management practices are associated with AED implementation?

(3) For facilities without AEDs, what constraints influence AED implementation?

Limitations

Even though managers worked at the same facility, they might not have had identical knowledge and perception of the use of AEDs. Therefore, biased responses to the survey questionnaires may have influenced the results. Some selected participants may have refused to participate for unknown reasons. Several incomplete survey packages were returned. The refusal of participation and incomplete surveys may have affected the measurement error and statistical analysis.

Delimitations

The participants were limited to health/fitness facility managers, whose responsibilities were to ensure a reasonably safe environment during business hours. In some facilities, several managers controlled the center, but only one manager from each health/fitness facility took the survey. Health/fitness facilities for the survey participants were selected from the 2010 directory of health/fitness facilities in South Korea.

Assumptions

(1) It was assumed that the participants responded to the survey questionnaires with truthfulness.

(2) It was assumed that the participants understood the survey questionnaires.

(3) It was assumed that the participants in charge of facility safety took the survey.

(4) It was assumed that constraints to AED implementation are measureable.

Definitions of Terms and Acronyms

Terms

AED: Automatic External Defibrillator: A device that automatically analyzes the heart rhythm, and if it detects a problem that may respond to an electrical shock, it will permit a shock to be delivered to restore a normal heart rhythm. . . . AEDs have been installed in many settings (such as schools and airports) and serve a role in expanding the number of opportunities for lifesaving defibrillation (MedicineNet, 2012).

CPR: Cardiopulmonary Resuscitation: The emergency substitution of heart and lung action to maintain life to someone who has suffered SCA. The two main components of conventional cardiopulmonary resuscitation (CPR) are chest compressions to make the heart pump and mouth-to-mouth ventilation to breathe for the victim. . . . If others are present, one person should attempt to locate an automated external defibrillator (AED) while another administers CPR (MedicineNet, 2012).

SCA: Sudden Cardiac Arrest: A medical emergency with absent or inadequate contraction of the left ventricle of the heart that immediately causes bodywide circulatory failure. The signs and symptoms include: loss of consciousness, rapid shallow breathing progressing

or the absence of breathing, profoundly low blood pressure with no pulses that can be felt over major arteries, and no heart sounds (MedicineNet, 2012).

VF: Ventricular Fibrillation: An abnormal irregular heart rhythm whereby there are very rapid uncoordinated fluttering contractions of the lower chambers (ventricles) of the heart. Ventricular fibrillation disrupts the synchrony between the heartbeat and the purse beat. Ventricular fibrillation is most commonly associated with heart attacks or scarring of the heart muscle from a previous heart attack (MedicineNet, 2012).

VT: Ventricular Tachycardia: An abnormally rapid heart rhythm that originates from a ventricle, one of the lower chambers of the heart. Although the beat is regular, ventricular tachycardia is life-threatening because it can lead to a dreaded condition, ventricular fibrillation (MedicineNet, 2012).

Unstaffed Health/Fitness Facility: A health/fitness facility that does not have employees or independent contractors working in the facility during operating hours. This situation can apply for all operating hours or a portion of the facility's operating hours (ACSM, 2011, p. xii).

Acronyms

AHA: American Heart Association

CASA: The Cardiac Arrest Survival Act requires the U.S. Secretary of Health and Human Services to establish guidelines for placing AEDs in federal buildings (NCED, 2011c).

EMS: Emergency Medical Services

NCED: National Center for Early Defibrillator in the United States

NCSL: National Conference of State Legislatures

OSHA: Occupational Safety and Health Administration, which oversees the implementation of health and safety regulations required by the federal government, as well as the adherence to these regulations by business (ACSM, 2011, p. xi)

PAD: Public Access Defibrillation, which involves giving the public at large access to AEDs in public and private settings in an effort to bring lifesaving defibrillation to as large a segment of the public as possible (ACSM, 2011, p. xi)

CHAPTER 2

REVIEW OF LITERATURE

This chapter reviewed the literature related to automated external defibrillators (AED) in the United States and South Korea. It included the evolution of AED programs, relevant legal actions, and the results of court decisions in both countries.

The Purpose and Role of Automated External Defibrillators

The general public may not understand the differences between sudden cardiac arrest (SCA) and a heart attack (LifeBeat, 2011). When an individual experiences a heart attack, one or more blood vessels are blocked; blood flow to the heart is slowed or stopped. Death of some part of the heart muscle is caused by the loss of blood supply. On the other hand, SCA occurs when an electrical error of the heart results in changing from the normal heartbeat to an abnormally fast and chaotic heartbeat (American Heart Association [AHA], 2011a). Severe brain damage, including unconsciousness, may occur within four to six minutes after blood flow ceases (Chain of Survival, 2011).

A victim of SCA requires immediate treatment with a defibrillator. This device delivers an electric shock to the victim's heart. Irregular beating of the heart stops when the electric shock restores a normal rhythm (National Heart Lung and Blood Institute [NHLBI], 2011). This procedure is known as "defibrillation." The use of a computerized device, known as an "automated external defibrillator" (AED) that delivers an electrical shock to victims of ventricular fibrillation (VF) SCA, contributes to increased survival rates of SCA victims.

Two primary factors influencing survival rates from ventricular fibrillation and sudden cardiac arrest (VF SCA) are (1) time from collapse to cardiopulmonary

resuscitation (CPR) administration, and (2) delivery time to defibrillation. If CPR is not provided, each minute of delay after VF to defibrillation decreases the victim's survival rates 7% to 10 % from VF SCA (American College of Sports Medicine [ACSM], 2011). If CPR and defibrillation are delivered immediately after collapse, the decrease in survival rates is lower, falling about 3% to 4% for each minute from collapse to defibrillation. When VF SCA victims receive immediate defibrillation from bystanders within five minutes of collapse, survival rates of up to 50% have been reported. Survival rates decreased to 10% when victims received defibrillation as long as 9 to 11 minutes following collapse (ACSM, 2011).

Some states have reported significant improvement of survival rates with the use of AEDs for cardiac arrest victims. For example, SCA survival rates in the state of Washington, when defibrillation was provided with AEDs, were 26%. Survival rates reported without AED use were 5%. The state of Iowa reported similar survival results, 19% with AEDs and 3% without AEDs (ACSM, 2011).

Evolution of AED Programs in the United States

An organization, a workplace, or a physician must have medical approval by the U.S. Food and Drug Administration (FDA) to rent or purchase an AED. Once FDA approval is obtained, the purchasers or leasers must learn the respective state regulations regarding AEDs (National Center for Early Defibrillator [NCED], 2011c). For example, state law may designate the locations for AEDs, training and education for users, and management policies.

According to Starr (1999), the two primary users of AEDs are medical and non-medical. Medical users provide health care in medical facilities. They include emergency

medical service (EMS) personnel who use an AED as part of their emergency medical procedures. These persons are regulated by state medical practice acts. Non-medical users are public access users who do not work for a medical center or an EMS agency. The use of AEDs by these persons is allowed as part of life-saving processes prior to assistance by a professional medical service or EMS (Starr, 1999). Appendix A shows how AED programs were developed with the efforts of various organizations. The AHA's (2010) updated *Guidelines for CPR and ECC*, noted that the "use of an AED does not require training, although training does improve performance" (p. 28).

AED programs are influenced by federal and state laws, results of court decisions, mandates for specific venues, Good Samaritan immunity, and manufacturer requirements (Lazar, 2007). Since the mid-1980s, the use of AEDs has become an important part of health policy. Since the mid-1990s, United Airlines, Northwest Airlines, and Frontier Airlines have faced lawsuits for failure to have an AED available (Narva, 2010). Thus, due to pressure from the Federal Aviation Administration (FAA), the Aviation Medical Assistance Act of 1998 (49 U.S.C. § 44701, Pub. L. 105-170) and the Code of Federal Regulation (14 CFR §121.803), requiring that AEDs be placed in aircraft, were passed. These acts require flight attendants to know CPR and the use of an AED (14 CFR §121.805).

Shortly after the airline industry accepted AEDs, the focus turned to health and recreational settings. A wide variety of sports, recreation, athletic programs, as well as fitness settings, experienced SCDs (Coris, Miller, & Sahebzamani, 2005; Drezner et al., 2007; Laukkanen et al., 2010). Some leading fitness clubs in United States, such as 24

Hour Fitness, Bally Total Fitness, and Sports & Fitness Clubs of America, also became involved in related lawsuits (Narva, 2010).

Even though the characteristics (e.g., reasons and results) of each lawsuit were different, these court decisions were enough to prompt the development of federal and state laws relevant to adopting AED programs in various settings. The significant effort to improve AED program legislation in the United States is displayed in Appendix A.

Legislation in the United States

Federal AED laws

Early federal AED laws contained recommendations and guidelines regarding federal buildings (42 U.S.C. § 238p), liability regarding emergency use of AEDs (42 U.S.C. § 238q), public access defibrillation programs (42 U.S.C. § 244), and public access defibrillation demonstration projects (42 U.S.C. § 245). However, these federal laws provide general information, not detailed instructions.

The U.S. Food, Drug and Cosmetic Act (21 U.S.C. § 301 et. seq.) and the Cardiac Arrest Survival Act (CASA) (2002) (42 U.S.C. § 238q) provided practical information about purchasing, leasing, training, and liability regarding emergency use of AEDs. The Cardiac Arrest Survival Act (42 U.S.C. § 238q) was designed to provide Good Samaritan legal liability immunity for any harm resulting from the use or attempted use of an AED. However, the statute does not cover:

- Acts for willful or criminal misconduct, gross negligence, and reckless conduct
- Licensed health professionals operating within the scope of their duty
- A hospital or clinic for healthcare
- Leased AEDs to a healthcare entity

AED Legislation by States

Unlike federal AED laws, all 50 states have more detailed legislation regarding the use of AEDs. As mentioned previously, the Federal Aviation Administration (FAA) has only one federal AED mandate: AEDs must be placed in specific locations and on commercial aircraft. For example, each state has its own laws regarding the designated locations of an AED. Beyond the placement of AEDs, state laws generally cover various topics including, but not limited to, Good Samaritan immunity, medical oversight, AED-certified users, written policies and procedures, and equipment inspection and maintenance.

Good Samaritan laws are defined as "state statutes that provide immunity from suit for negligence for persons who administer emergency care to others" (Clement, 2004, p. 31). Since California enacted the first Good Samaritan law in 1959, many states have passed similar legislation to encourage rescuers to help victims without fear of lawsuits.

Some health/fitness professionals have been hesitant to use AEDs fearing legal liability (Connaughton, Spengler, & Zhang, 2007; Lubin, Chung, & Williams, 2004). Health/fitness club managers should be aware of the Good Samaritan laws in their respective states that would exempt an individual from liability for aiding a victim in distress. The Good Samaritan legislation, the Cardiac Arrest Survival Act, the Rural Access to Emergency Devices Act, and the federal Public Health Improvement Act of 2000 have played roles in exempting rescuers from liability for negligence (Balady et al., 2002).

Each state has considered its negligence liability principles and need for AEDs in specific places, as shown in Table 2.1. To date, many states have placed AEDs at

designated places in schools, health clubs, and day care centers. Even though only a few states have added special AED locations, such as dental clinics and swimming pools, states may consider other specific places to place AEDs in the future. Table 2.1 provides examples of current legislative AED placement mandates (NCSL, 2012).

Table 2.1

AED Locations by States

AED Location	States Requiring or Supporting AED Placement
Schools	California "urges" K-12 schools to implement AED program (2005). Colorado (donations), Florida, Georgia (2008), Illinois, Iowa (2010), Maryland, Michigan, Nevada, New York (NY Edu. Laws § 917), Ohio, Pennsylvania, South Carolina (2008), Virginia, and Wisconsin (2010) require some schools to have portable defibrillators; but actual extent varies. Tennessee "encourages" placement in schools (2008).
Health Clubs	California, Illinois, Indiana (2007, 2008), Massachusetts (2007), Michigan, New Jersey, New York, Rhode Island, and the District of Columbia (2008) laws now require health clubs to have at least one AED. *Definition example (Michigan)*: "Health club" means an establishment that provides, as its primary purpose, services or facilities that are purported to assist patrons in physical exercise, in weight control, or in figure development, including, but not limited to, a fitness center, studio, salon, or club. A health club does not include a hotel or motel that provides physical fitness equipment or activities, an organization solely offering training or facilities for an individual sport, or a weight reduction center.
Day Care Centers	Wisconsin (2008) requires day care center personnel to have AED proficiency.
Dental Offices	Illinois (2009), Wisconsin (2008) requires dentists to have AED proficiency.
Public Assembly	New York (2006)
Swimming Pools	New York (2008). Oregon (Ore. Adm. Rule 333-060-0210)

Source: National Conference of State Legislatures (2012)

AEDs in Sports and Health/Fitness Facilities

Currently, 11 states, Arkansas (Ark. Code. Ann. § 20-13-1306(b)(1)), California (Cal. Health & Safety Code§ 104113(a)(1)), Illinois (210 Ill. Comp. Stat. §74/15(a)), Indiana (Ind. Code §24-4-15), Louisiana (La. Rev. Stat. Ann. §40:1236.13(D)(1)), Massachusetts (Mass. Gen. 93§78A), Michigan (Mich. Comp. Laws § 333.26312), New Jersey (N.J. Rev. Stat. §2A:62A-31), New York (N.Y. Gen. Bus. §627-a), Oregon (Ore. Rev. Stat. §431.680(2)), and Rhode Island (R.I. Gen. Laws § 5-50-12(a)) have legislation mandating the placement of AEDs in health/fitness facilities in their respective states (ACSM, 2011; Connaughton et al., 2007).

Among these 11 states, three, including Illinois, New York, and Oregon, specify the size requirement for the health/fitness facility, as shown in Table 2.2 (ACSM, 2011). For example, fitness facilities in Illinois require AEDs when the number of members is more than 100 (§210 Ill. Comp. Stat. 74/15(a)). Oregon (Ore. Adm. Rule 333-060-0210) requires AEDs at pools of health clubs whose membership numbers are 100 or more. New York (N.Y. Gen. Bus § 627-a) mandates that the minimum membership of 500 be a requirement for the placement of AEDs.

Most of the states which mandate the placement of AEDs in health clubs require that at least one staff member be certified in the delivery of CPR and in the operation of an AED during that facility's operating hours. Four states, Arkansas, Indiana, Massachusetts, and Rhode Island, have legislation that permits unstaffed facilities (e.g., 24/7 key-card access facilities) to use AEDs without the presence of trained staff (ACSM, 2011).

Table 2.2

States with AED Legislation for Health/Fitness Facilities

State	Protection from Civil Liability	Require Employee CPR/AED Training	Size Requirement for Facility	Financial Assistance Provided to Facilities	Law Covers Unstaffed Facilities
Arkansas	●	●			●
California	●	●			
Illinois	●	●	●		
Indiana	●	●			●
Louisiana	●	●			
Massachusetts	●	●			●
Michigan	●	●		●	
New Jersey		●		●	
New York	●	●	●		
Oregon	●		●		
Rhode Island	●	●			●

Source: ACSM (2011)

As the federal government encourages the Public Access Defibrillation (PAD) program, the use of AEDs in unstaffed facilities may be an instance of PAD programs in health/fitness clubs. If a patron suffers sudden cardiac arrest at an unstaffed facility, an untrained member or witness has the possibility of delivering CPR or administrating AED within four minutes or less before medical professionals arrive. These PAD programs can be successful in increasing survival rates of SCA victims. New legislation by individual states should be considered to allow the use of AEDs in unstaffed facilities without fear of lawsuits (ACSM, 2011).

Standards and Guidelines of Professional Sports Organizations

Some professional sports organizations have developed standards and guidelines regarding AEDs in health/fitness facilities. The American College of Sports Medicine's (ACSM) *Health/Fitness Facility Standards and Guidelines* (4th Ed., 2011) suggests the five following standards for use of AEDs and PAD programs:

> (4) In addition to complying with all applicable federal, state, and local requirements relating to automated external defibrillators (AEDs), all facilities (i.e., staffed or unstaffed) shall have as part of their written emergency response policies and procedures a public access defibrillation (PAD) program in accordance with generally accepted practice, as highlighted in this section; (5) AEDs in a facility shall be located within a 1.5-minute walk to any place an AED could be potentially needed; (6) a skills review, practice sessions, and a practice drill with the AED shall be conducted a minimum of every six months, covering a variety of potential emergency situations (e.g., water, presence of a pacemaker, medications, children); (7) a staffed facility shall assign at least one staff member to be on duty during all facility operating hours who is currently trained and certified in the delivery of cardiopulmonary resuscitation and in the administration of an AED; (8) unstaffed facilities shall have as part of their written emergency response policies and procedures a PAD program as a means by which either members and users or an external emergency responder can respond from time to collapse to defibrillation in four minutes or less (p.18).

The AHA and ACSM jointly recommend the placement of AEDs in health and fitness facilities, as per the statement on *Automated External Defibrillators in Health/Fitness Facilities*:

> Effective placement and use of AEDs at all health/fitness facilities is encouraged, as permitted by law, to achieve the goal of minimizing the time between the recognition of cardiac arrest and successful defibrillation. Until further definitive data are available, AED placement is strongly encouraged in those health/fitness facilities with a large number of members (i.e., membership > 2,500); those that offer special

> programs to clinical populations (i.e., programs for the elderly or those with medical condition); and those health/fitness in which the time from recognizing cardiac arrest until the first shock is delivered by the EMS is expected to be > 5 minutes. In unsupervised exercise rooms, such as those that might be located in hotels, apartments complexes, or office buildings, the AED should be part of the overall public access to a defibrillation plan for the host facility (Balady et al., 2002, pp. 1148-1149).

The International Health, Racquet, and Sportsclub Association (IHRSA) also supports protections for facilities that have AEDs. They express concern that having AEDs in facilities will mean that the staff in such organizations will be forced to assume more liability:

> IHRSA supports AED legislation that contains necessary liability protections--use and non-use--for club owners and their employees, reasonable staffing requirements for staffed and unstaffed clubs, and adequate compliance time. . . . Some laws, which mandate AEDs in health clubs, also require a person trained in its use to be on staff. . . . If a cardiac arrest occurs at a club that has an AED but no one is on duty that is trained to use it, the club could be found liable for negligence. This requirement becomes problematic for 24-hour health clubs, which are unstaffed during certain hours. . . . Some laws do not provide enough time for health clubs to acquire an AED. . . . Many club owners and employees are concerned that having an AED on the premises will increase their responsibility, thereby increasing their risk of liability (IHRSA, 2012).

Published Court Decisions Involving AED Programs

To date, few court decisions in the United States have directly involved AEDs or AED programs. Most lawsuits have been filed against organizations that did not have or did not use an AED. A search of reported AED and fitness United States court decisions obtained from Lexis/Nexis Academic Universe for a five-year period between 2007 and 2012, identified six cases, one each in 2007, 2008, and 2009, and three in 2011. California and New York were each represented by two cases, and one case each was

found in Florida and Pennsylvania. Five of the six cases occurred in fitness facilities; the sixth occurred in an ice hockey arena. Five of the six incidents resulted in the death of the victim; one person survived but sustained severe brain damage. Five were adult males, the hockey player was a male minor. The three 2011 cases involved Bally Total Fitness establishments, two in California and one in Pennsylvania.

In *Rotolo et al. v. San Jose Sports and Entertainment, LLC et al.* (2007), Christine Rotolo, the parent of the teenager who died in an ice hockey match, sued the operators of the ice arena for wrongful death. Their claim was that the facility had an obligation to "notify users of the facility of the existence and location of an automatic external defibrillator (AED) at the facility" (p.774). Even though state law recommended the use of defibrillators and provided immunity to those who purchased and implemented defibrillators, common or case law did not require that defibrillators be used. The trial court and the court of appeals found for the San Jose Sports and Entertainment facility.

The estate of the man who perished while using a stepping machine at an L.A. Fitness Club succeeded at the trial court level (*L. A. Fitness International LLC v. Mayer,* 2008). A jury in the Broward County, Florida Judicial Circuit Court found the club to be 85% negligent. The jury stated that (1) the victim was not properly screened for health problems, (2) CPR was never performed during the incident, (3) the club did not have a defibrillator, and (4) employees were not competent to handle an emergency. The Fitness Club appealed the decision. The court of appeals reversed the decision based on the release (referred to as a "contract") that the couple had signed when they joined the club. The couple had stated that they were in good physical health, and that they had seen a medical doctor recently. The latter was not true. The court also ruled that the Florida

Cardiac Survival Act did not require that an AED be present on the premises of an exercise facility.

In *Brown v. Atlas-Kona Kai, Inc.,* (2009), an adult male collapsed in the hallway of a Health Club and died of cardiac arrest 1 hour and 20 minutes later. His wife sued for wrongful death, negligence, premise liability, and failure to warn. She noted that the club failed to have a portable defibrillator, staff trained as first responders, or a system in place for quickly obtaining emergency medical assistance. The trial court ruled that Kona Kai had met its duty to promptly summon emergency services and that was the extent of their responsibility. Brown appealed the decision. The Court of Appeals affirmed the lower courts' decision even though evidence suggested that it took 22 minutes to obtain emergency medical support and that one of the first responders did not know how to perform CPR.

Gregory C. Miglino was playing racquetball at a club owned and operated by Bally Total Fitness when he collapsed. Emergency medical services were summoned and arrived in eight minutes; Gregory later died at the hospital. His son, Gregory, Jr., as executor of his father's estate, sued Bally's for negligence (*Miglino v. Bally Total Fitness*, 2011). The gym professional trained to use the defibrillator assessed the victim and chose not to use the defibrillator. The issue in the case was "whether the General Business Law 627-(a) which mandated that a health club in the State of New York provide an AED . . . gave rise to a cognizable statutory cause of action in negligence." Defendant Bally filed a motion to dismiss the case. The court found for Miglino. Bally Total Fitness appealed. The Court of Appeals found that the trial court properly denied the defendant's (Bally Total Fitness) motion to dismiss the case since its employee had assumed a duty by

coming to the decedent's assistance. This was the first and only case of this LexisNexis search won by the victim.

Another Bally Total Fitness decision in 2011 was Rayford Chappill who collapsed using a pull-down machine (*Chappill v. Bally Total Fitness,* 2011). In this case, EMS arrived within three minutes. CPR failed to resuscitate the victim, and Chappill was transported to a hospital. He survived but suffered considerable brain damage. Three years later, he sued *Bally Total Fitness* for negligence for failure to have an AED on the premises and for failure to train employees to handle cardiac emergencies. Bally Total Fitness responded by asserting immunity under the Good Samaritan Statute. The trial court and the Court of Appeals found for Bally Total Fitness. The Court of Appeals stated that at the time of the heart attack, "Health clubs were not required to keep an AED on the premises. And even after the enactment of such law requiring such a device, health clubs had no common law duty to use the AED, and could not be held liable for not using it" (p. 5-6).

Bally Total Fitness of Philadelphia was sued by Cline Goldin, as executor for Peter M. Goldin, after Peter collapsed and died from a cardiac arrest while exercising at the club (*Goldin v. Bally Total Fitness,* 2011). His complaint was threefold: negligence, wrongful death, and a survival action. The main premise was that the club failed its duty to have an AED available for use. The trial court ruled that a sports club did not have a duty to acquire, maintain, or use an AED. The Court of Appeals of Philadelphia County affirmed the decision.

Research on Sudden Cardiac Arrest and AEDs in Sport Settings

It is important to plan and prepare for cardiac emergencies in sport settings. Yet, even though legislation existed in all states in 2001, previous studies have stated that many health/fitness facilities did not provide for such events.

In 2001, IHRSA conducted a study on AED installation in 162 facilities (IHRSA, 2002). The findings of the study revealed that 25% of those responding to the survey had at least one AED on site. The 11 reasons for having an AED in the club were as follows: (1) high percentage of older or deconditioned members, (2) not close to local EMS, (3) in response to a previous medical emergency at club, (4) essential device for CPR training, (5) dropped prices in recent years, (6) media coverage as lifesaving equipment, (7) marketing and public relations value, (8) state's Good Samaritan legislation, (9) request by members, (10) request by cardiac rehabilitation, and (11) a concern for AEDs as an industry standard. The data also identified six various constraints related to implementation of AEDs in the IRHSA facilities: (1) liability for incorrect use, (2) failure to use equipment when it is available, (3) proximity of emergency medical services, (4) difficulty in training staff, (5) cost, and (6) insurance coverage issue (IHRSA, 2002).

The New York Gen. Bus. §627-a, which went into effect in July 2005 and was amended in April 2011, required all New York state health/fitness clubs with 500 or more members to have an AED on site, and at least one employee or volunteer who would have a valid certificate to use an AED and conduct CPR during all business hours. Connaughton et al. (2007) found that 19.6% of the 231 clubs responding to a survey on this issue did not have an AED trained operator during all business hours.

Connaughton et al. (2007) reported that while 87% of managers (N = 108) of health/fitness clubs in the state of Florida had CPR certification, only 20% were AED certified. Nearly one-half (45%) of the respondents reported that they had no knowledge of the state's AED immunity statutes. Another finding of the study showed that the manager's most important constraint to the implementation of AEDs in health/fitness clubs was the cost of the AED, the cost of in-service training, and the cost of maintaining an AED.

In 2011, a study of AED implementation in Florida high school athletic departments, conducted by Connaughton, Spengler, Zhang, and Carroll (2011), revealed that 79% of the 269 respondents had no knowledge or limited knowledge of the Florida AED immunity laws. Among constraints to AED implementation in this study were various costs (purchase, maintenance, certifications, and staff training) confirming the study by Connaughton et al. (2007).

Background of AED Programs in South Korea

Sudden cardiac death is the third major cause of death in South Korea (Korean Statistics Information Services [KOSIS], 2010). Because of the rapid increase in cardiovascular disease and an aging society, the possibility of sudden cardiac death in Korea is rising (Korean Association of Cardiopulmonary Resuscitation [KACPR], 2011). An older age group has greater chances of suffering a sudden cardiac death than a younger age group. For example, only 30 of 100,000 people in their 30s may experience SCD. However, 100 cases of sudden cardiac death per 100,000 people occur for those in their 50s, 300 cases for those in their 60s, and 700 cases for those in their 70s (KACPR, 2011).

The Ministry of Health and Welfare in South Korea estimated that approximately 25,000 to 30,000 Koreans die outside the hospital setting every year due to sudden cardiac arrest. The survival rate of SCA in Korea is only 2.5% (KOSIS, 2010). The research data from the United States and European countries emphasize the importance of using AEDs to increase the survival rate of SCA. For example, in Seattle, Washington, the survival rate of SCA increased to 25% after placement of AEDs (Jeffrey, 2007). Many other developed countries with AED programs showed a 15% survival rate on average (Ko, 2006).

Medical researchers and governmental parties in South Korea have addressed Emergency Medical Service (EMS), CPR, automated external defibrillators, and public access to defibrillation as a means of overcoming SCD. Multiple Korean studies found that fewer than 5% of SCA patients received AED treatment before arriving at hospitals (Kim & Kang, 2011). Only 1.4% of first responders, in Korea, performed CPR or used an AED due to a lack of CPR or AED education and/or for fear of legal liability for faulty emergency treatment (Cho, 2011). Even though the South Korean Good Samaritan law allows laypeople to voluntarily use CPR and AED without liability, most people regard CPR and AED usage as being administered only by health professionals (Kim & Kang, 2011).

Development of AED and PAD Programs in South Korea

In the early stages of change in AED and public access defibrillation (PAD) programs, the Ministry of Health and Welfare in South Korea implemented the *2006 CPR Guidelines* under the leadership of the America Heart Association (AHA) and the European Resuscitation Council. The Korean Association of Cardiopulmonary

Resuscitation (KACPR) created an agreement with the AHA and the International Training Organization to provide CPR education in 2005. In 2006, Korea became a member of the International Liaison Committee on Resuscitation (ILCOR) (Oh, 2006). Asian countries, including South Korea, Japan, Taiwan, and Singapore, established the Resuscitation Council of Asia (RCA) in 2004 to provide ethnic data of Asian SCA victims to ILCOR (KACPR, 2011).

In 2006, the Korean government conducted an epidemiological investigation of SCA victims. The investigation included SCA accident locations, emergency medical treatment response time, survival rates, and emergency action (Kim & Kang, 2011). Results of the research showed that the arrival of EMS to the injured person took an average of 7.8 minutes, the operation of the AED took an average of 13 minutes, and the transporting of the victim to the hospital took an average of 24 minutes (Kim & Kang, 2011). If the EMS response time to the location exceeds 10 minutes, the chance of survival, without CPR by bystanders and defibrillation by first responders, is almost zero (Eisenberg, 2007). When SCA occurs, the closer the AEDs are to the SCA victims, the faster the treatment can be administered and the higher the probability that lives will be saved (Lazar, 2007).

According to research conducted in the United States and European countries, the number of AED experts in South Korea was insufficient. Education and management programs of AEDs and PAD programs needs to be improved (Rhoe, Park, Kim, & Lee, 2006). To compensate for these inadequacies, the South Korean government, in 2008, altered and amended the articles of the Emergency Medical Service Act to include the following stipulation: AEDs will be mandatorily located in public institutions with large

populations and public open-access facilities under Article 26-2 of the Enforcement Decree of Emergency Medical Service Act (Emergency Medical Service Act, 2011).

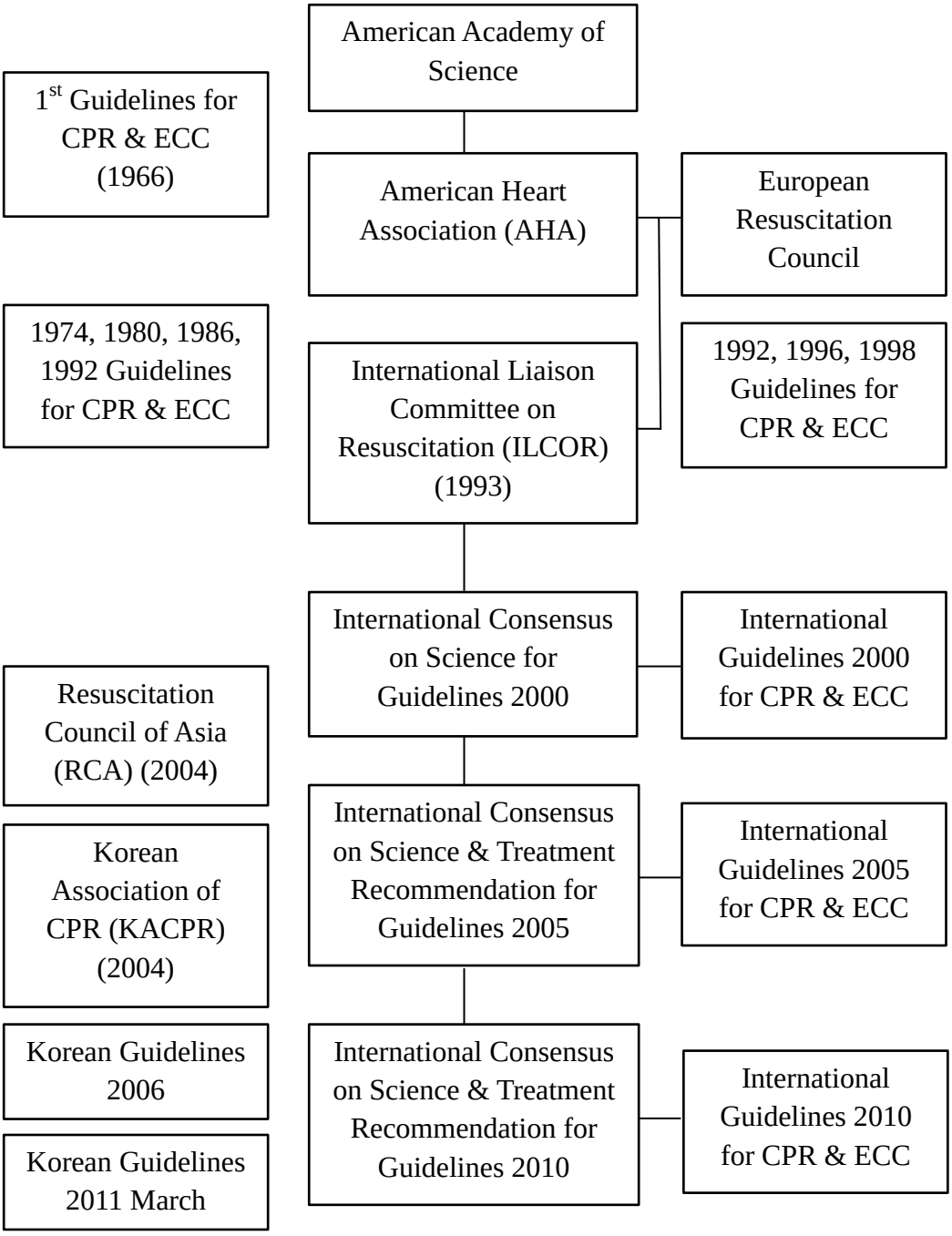

Figure 2.1 The International Organizational Chart regarding Developing CPR Guidelines (Cho, 2011).

Iwami et al. (2006) discussed research among survival rates from out-of-hospital cardiac arrests as notably different from other cardiac arrests. Persons who had a cardiac arrest at the workplace were about six times more likely to survive than persons who had an SCA at a private residence. Also, persons in a public place were three to four times more likely to survive. Thus, having a SCA at the workplace or in a public setting was considered a stronger predictor of survival than was an incident in private residences.

As a result of this research, the Korean government recommended placement of AEDs as follows:

- Places where persons have had SCAs within the last two years
- Places where more than 250 people in their 50s or older spend more than 16 hours per day

However, some researchers recommended that AEDs be located where SCA victims were located within the last five years instead of the last two years (KACPR, 2011).

Placement of AEDs

The specific needs and site distributions for AEDs will likely vary from one community to another. According to Ko's (2006) study with an example in King County, Washington, of which Seattle is the county seat, the incidence of cardiac arrest in a public setting is greatest at the international airport, followed—in order of decreasing frequency—by county facilities, shopping malls, public sports places, industrial sites, golf courses, shelters, ferries, train terminals, health/fitness clubs, gyms, and community and senior centers. Other PAD planners targeted locations with a high concentration of people in their 40s, 50s, and older, such as senior centers.

In 2009, based on the Emergency Medical Service Act in South Korea, the South Korean government assigned 13,623 designated AED locations. The appointed places were passenger transportation terminals, railroad stations, harbors, casinos, racing facilities, multi-sports complexes, prisons, and other places assigned by the minister of Health and Welfare. Even though the placements were appointed mandatorily, only 2,611 AEDs were installed at those designations. The AED distribution rate was lower than 20% (Kim & Kang, 2011). With the low rate of AED installations, the actual usage was also very low. According to Kim and Kang (2011), insufficient education on CPR and the use of AEDs led to only 7% of actual use in 2009 and 10% in 2010.

Sports-related facilities, horse, bicycle, and motorboat racing facilities, and sports arenas, with a capacity of more than 5,000 participants, were required to sponsor AED programs (Emergency Medical Service Act, 2011). So far, no requirements have been applied to schools' sports facilities, health/fitness clubs, and recreational sports places. While the South Korean government has attempted to reinforce the CPR and AED education programs for trainers in fitness clubs, such programs are not required.

South Korean Legislation Related to AEDs

South Korean laws regarding AEDs have been in effect since 2008. In the beginning, the South Koreans examined the laws of other developed countries to set a standard for their country. Since 2008, South Korean laws on AEDs have been edited by the Emergency Medical Service Act with the most recent edition in 2011 (Article 47-2, Figure 2.2; Article 14, Figure 2.3; Article 5-2, Figure 2.4; Article 63, Figure 2.5)(Emergency Medical Service Act, 2011).

In contrast to laypeople, individuals who are aware of the list under Article 14 of the Emergency Medical Service Act, including paramedics, non-healthcare first responders are required to use an AED in certain circumstances. As for the public safety teams, failure to have and to use an AED could result in legal liability.

Although few instances have occurred of employers being sued for their use of an AED, fear of potential lawsuits has weighed heavily in the debate between those who support the use AEDs and those who object to their use. A primary concern for objectors is often the legal duty. Even though many AED manufacturers offer indemnification programs for purchasers, it is important to also indemnify users, including trainers, medical directors, and maintenance personnel (Bae, 2008).

In terms of immunity, prior to Article 5-2 (see Figure 2.4) of the Emergency Medical Service Act and amendment of Article 63 (see Figure 2.5) of the Emergency Medical Service Act in 2008, no statutes existed in South Korea similar to the Good Samaritan laws of the United States (Bae, 2008). Although the Good Samaritan Law Article 63 of the Emergency Medical Service Act was enacted (Emergency Medical Service Act, 2011), the awareness of this law was only 20% (Kim, Cho, Na, Cho & Kim, 2010).

CHAPTER VIII OF EMERGENCY MEDICAL SERVICE ACT
TRANSFER, ETC. OF EMERGENCY PATIENTS

Article 47-2 (Duty of Possession of Emergency Equipment for Cardiopulmonary Resuscitation)

(1) Institutions, etc. falling under any of the following subparagraphs shall have emergency equipment which can perform cardiopulmonary resuscitation, such as automated external defibrillator or such:

1. Public health and medical services institutions under Article 2 of the Public Health and Medical Service Act;

2. Ambulances being operated by first-aid teams under Article 35 of the Framework Act on Fire Services;

3. Passenger airplanes being used for the purpose of air transportation business from among the airplanes under subparagraph 1 of Article 2 of the Aviation Act and airports under subparagraph 5 of Article 2 of the same Act;

4. Passenger trains from among the rolling stock under subparagraph 4 of Article 3 of the Framework Act on the Development of Railroad Industry;

5. Ships, gross tonnage of which is not less than 20 tons from among ships under Article 1-2 of the Ship Act;

6. Other public institutions prescribed by Presidential Degree

(2) Matters necessary for management, etc. of emergency equipment which should be possessed pursuant to paragraph (1) shall prescribed by Ordinance of the Ministry for Health, Welfare and Family Affairs.

[This Article newly inserted by Act No. 8692, Dec. 14, 2007]
[This Article Amended by Act No. 11004, Aug. 4, 2011]

Figure 2.2 Article 47-2 of the EMERGENCY MEDICAL SERVICE ACT

Source: Statutes of the Republic of Korea (2012)

Article 14 (Education on Rescuing and First-Aid Treatment)

(1) The Minister for Health, Welfare and Family Affairs or the Mayor/Do Governor may order a person falling under any of the following subparagraphs to receive education on rescue and first-aid treatment: <Amended by Act No. 6677, Mar. 25, 2002; Act No. 8692, Dec. 14, 2007; Act No. 8852, Feb. 29, 2008>

1. Drivers of ambulances, etc.;
2. Drivers of cars for the purpose of passenger transport service business under Article 3(1) of the Passenger Transport Service Act;
3. Health education teachers under Article 15 of the School Health Act;
4. Police officers, etc. described in Article 5 of the Road Traffic Act as persons engaged in the road traffic safety affairs;
5. Persons subject to education on safety and health under Article 32(1) of the Industry Safety and Health Act;
6. Persons engaged in affairs on medical service, relief or safety in sports facilities under Article 5 and 10 of the Installation and Utilization of Sport Facilities Act;
7. Life rescuers under Article 22 of the Excursion Ship and Ferry Business Act;
8. Persons engaged in affairs on medical service, relief or safety from among the persons engaged in tourism under Article 3(1) 2 through 6 of the Tourism Promotion Act;
9. Persons engaged in affairs on medical service, relief or safety from among the persons engaged in aviation or cabin attendants under subparagraphs 3 and 3-2 of Article 2 of the Aviation Act;
10. Persons engaged in affairs on medical service, relief or safety from among the persons engaged in railroad transportation under subparagraphs 9(a) through (c) of Article 2 of the Railroad Safety Act;
11. Persons engaged in affairs on medical service, relief or safety from among the seafarers under subparagraph 1 of Article 3 of the Seafarers Act.

(2) The Minister for Health, Welfare and Family Affairs and Mayor/Do Governor shall formulate and execute plans for education and public relations of the essentials or such of first-aid treatment under Article 4(1), as prescribed by Presidential Decree annually. In such cases, when formulating plans for education and public relations, the Minister for Health, Welfare and Family Affairs shall consult with the Administrator of the National Emergency Management Agency. <Newly Inserted by Act No. 9124, Jun, 13, 2008; Amended by Act No. 11004, Aug, 4, 2011>

(3) The Mayor/Do Governor should report the results of the education and public relations to the Minister for Health, Welfare and Family Affairs. <Newly Inserted by Act No. 11004, Aug, 4, 2011>

(4) The necessary matters concerning the contents and method of education on the rescue and the first-aid treatment as prescribed in paragraphs (1) and (2) shall be determined by Ordinance of the Minister for Health, Welfare and Family Affairs. <Amended by Act No. 8852, Feb, 29, 2008; Act No. 9124, Jun, 13, 2008; Act No. 11004, Aug, 4, 2011>

Figure 2.3 Article 14 of the EMERGENCY MEDICAL SERVICE ACT

Source: Statutes of the Republic of Korea (2012)

CHAPTER II EMERGENCY MEDICAL RIGHT AND DUTIES OF CITIZENS

Article 5 -2 (Exemption from Responsibility for Well-Intentioned Emergency Medical Service)

In cases where no intention or gross negligence is committed on the property damage and death or injury caused by giving any emergency medical service or first-aid treatment falling under any of the following subparagraphs to an emergency patient whose life is in jeopardy, the relevant actor shall not take the civil liability and penal responsibility for injury, and the penal responsibility for death shall be reduced or exempted:

1. First-aid treatment provided by a person other than a person falling under any of the following items;
    (a) Persons engaged in emergency medical service;
    (b) Persons in charge of first-aid treatment under Article 78-2 of the Seafarers Act, persons liable to provide first-aid treatment pursuant to other Acts and subordinate statutes, such as first-aid teams under Article 35 of the Framework Act on Fire Services;

2. Emergency medical service provided by a person engaged in emergency medical service within the extent of his/her license or qualification when he/she is not on duty;

3. First-aid treatment provided by a person liable to provide first-aid under subparagraph 1(b) when he/she is not on duty.

[This Article Newly Inserted by Act No. 9124, Jun, 13, 2008]

Figure 2.4 Article 5-2 of the EMERGENCY MEDICAL SERVICE ACT related to the Good Samaritan Law

Source: Statutes of the Republic of Korea (2012)

CHAPTER X PENAL PROVISIONS OF EMERGENCY MEDICAL SERVICE ACT
Article 63 (Reduction of or Exemption from Punishment for First-Aid Treatment and Medical Service)

(1) In cases where an emergency patient is brought to death or injury due to emergency medical service urgently provided by a person engaged in emergency medical service in order to prevent a risk to life, a grave mental or physical harm or ingravescence of symptoms of the emergency patient, when the emergency medical service provided is unavoidable and no gross negligence exists in the person who has provided the emergency medical service, a punishment under Article 268 of the Criminal Act may be reduced or exempt in consideration of the extenuating circumstances.

(2) In cases where an emergency patient is brought to death or injury due to first-aid treatment (including cases where an automated external defibrillator is used) urgently provided by a person liable to provide first-aid treatment under subparagraph 1 (b) of Article 5-2 in order to prevent a risk of life, a grave mental or physical harm or ingravescence of symptoms of the emergency patient, when the relevant first-aid treatment is unavoidable and no gross negligence exists in the person who has provided the first-aid treatment, a punishment may be reduced or exempt in consideration of the extenuating circumstances.

[This Article wholly amended by Act No. 9124, Jun, 13, 2008]

Figure 2.5. Article 63 of the EMERGENCY MEDICAL SERVICE ACT related to Reduction of Punishment.

Source: Statutes of the Republic of Korea (2012)

Incidents Related to AED Programs in South Korea

Compared to the United States, with more than 200,000 AED sales for public use annually (Shah & Maisel, 2006), the history of AEDs in South Korea is short and the implementation rates are low. Therefore, it was difficult to find South Korean SCA-related lawsuits involving health/fitness facilities. Several SCA incidents arose in sport events, but limited incidents have occurred in health/fitness facilities.

Five incidents are presented as follows. One each in 2000 (baseball event) and 2011 (soccer event), and three in 2010 (swimming pool, marathon event, and horse-racing). Two (baseball and marathon) of the five incidents resulted in the death of the victim. One victim (soccer) survived but had physical damage. Two (baseball and soccer) were professional athletes, and three were recreational participants (swimming, marathon, and horse-racing).

Twelve years ago, South Korean emergency medical systems in sport settings were poorly organized, and AEDs were scarce in sport settings. An incident that highlighted the need for AEDs in South Korea involved Mr. Lim. On April 18, 2000, Lim stood on second base after he made a two-base hit during a professional baseball game in South Korea. Suddenly, he fell down and was unconscious due to VF SCA. The arrival of the local EMS was delayed because they were not familiar with the directions to the entrance of stadium. Other players, officials, and the coaching staff hesitated to provide first aid to Lim due to fear of harm and legal liability. No legislation, such as Good Samaritan immunity to protect first-aid providers, was in place in 2000. As a result, Lim was not provided first aid treatment in a timely manner. Consequently, Lim went into a vegetative state because of missing prompt emergency treatment, such as CPR or AED.

Lim passed away in 2010 after spending 10 years in an unconsciousness state in the hospital. After this event, the baseball stadium developed an emergency action plan, including having an ambulance present and medical equipment in the stadium (Oak, 2010).

A swimmer in his 50s collapsed while swimming in a sports complex located in Seongnam, Gyeonggi Province, in December 2010. In this case, a lifeguard delivered CPR immediately while another lifeguard brought an AED. The CPR and AED treatment were delivered within five minutes. The lifeguards at the complex regularly practiced emergency care including CPR and AED treatment including removing a person from the pool. Even though there was no legal duty to use a defibrillator, the facility manager recognized the need of AED implementation, and provided periodical training sessions for employees to prepare for emergency situations (Philips Electronics, 2011).

During the 2010 Seoul International Marathon, one of the major sport events in South Korea, an amateur male runner perished. Police and emergency medical service were contacted by spectators and arrived in about 10 minutes. However, there were no emergency personnel and no AED in the emergency medical vehicle. The patient was transported to a hospital but later died (Lee, 2011). In a similar incident, a male runner in his 60s collapsed at the Boston Marathon in April 2010. He was given CPR by a fellow runner and an AED was administered by a Boston bike patrol member. The victim was transported to a nearby hospital and recovered (Shrieves, 2010). The two marathon incidents happened under similar situations, but the results were totally different due to the readiness and rapid response to the medical emergencies.

On May 29, 2010, a horse-racing spectator collapsed while watching a horse race at a branch of the Korea Racing Association. A trained staff member approached the victim within a minute. She checked the victim's breathing and heart rate, and performed chest compressions until another trained staff member administered an AED to the victim. After about 18 minutes, EMS arrived and moved the victim to a nearby hospital. Seven days later, the victim recovered and was in good health. The facility manager stated that given the characteristics of horse-racing events and with more than 2,000 spectators on average, trained staff members with an AED are always present (Philips Electronics, 2010).

Mr. Shin, a 24-year-old professional soccer player in a South Korean league, collapsed on May 8, 2011, from SCA while participating in a match. After collapsing, medical staff on the field provided prompt first aid and CPR within the first three minutes. Shin was evacuated to the nearest hospital emergency room. It took only four minutes from the soccer field to the emergency room. The primary reason for his SCA was ventricular fibrillation. Even though his heart rhythm was restored with defibrillation within 10 minutes at the emergency room, he did not regain consciousness. Fifty days later, after being hospitalized in the intensive care unit, Shin regained consciousness. He then spent 70 days in rehabilitation to learn to walk, but never returned to soccer (Kim & Lee, 2011).

CHAPTER 3

METHODOLOGY

In this chapter, the measures used to investigate the primary purpose of the research are described. Information regarding research design, population and sample, data collection, survey instrumentation, validity and reliability, and statistical analysis are provided.

The primary purpose of this research was (1) to investigate the status of automated external defibrillator (AED) implementation in South Korean health/fitness facilities; (2) for health/fitness facilities with AEDs, to investigate risk management practices associated with AED implementation; and (3) for health/fitness facilities without AEDs, to investigate constraints to AED implementation. Additional research questions focused on manager's knowledge regarding AED legislation. The researcher also examined how facilities were involved in pre-participation screening of their members for reducing the potential risk of sudden cardiac death (SCD).

Research Design

A non-experimental, cross-sectional, quantitative survey was used for this investigation. A cross-sectional study was useful to understand the demographic variables, including gender, location, and number of members at a specific time. Also, quantitative research was used to compare the difference among various groups, including the status of AED implementation by location, gender, number of members, level of manager's knowledge of AED legislation, and other variables.

Participants and Selection

Based on the statistics of the South Korean government, 6,128 health/fitness facilities existed in South Korea in 2010 (Korean Statistical Information Services [KOSIS], 2010). The target population for this study included managers from all of the identified health/fitness facilities open to the public in South Korea. Facilities that focused on employee fitness and clinical therapy, such as cardiac rehabilitation programs, spas, and personal training studios, were excluded from the study. Table 3.1 presents the distribution of health/fitness clubs in South Korea by province in 2010.

Table 3.1

Distribution of Health/Fitness Facilities in South Korea by Province

Province	Number of Facilities
Seoul	1,496
Gyeonggi	1,553
Gangwon	165
Chungcheongbuk	187
Chungcheongnam	433
Gyeongsangbuk	653
Gyeongsangnam	1,029
Jeollabuk	183
Jeollanam	359
Jeju	70
Total	6,128

Source: Korean Statistics Information Services (2010)

A list of up to date health/fitness clubs was obtained from the South Korea Bodybuilding and Fitness Federation (KBBF).The list of fitness clubs was sorted by province. Thus, the facilities were numbered alphabetically.

Stratified random sampling was used to select representative samples from the population. Stratified random sampling is defined as "a type of probability sampling technique. . . . With the stratified random sample, there is an equal chance of selecting

each unit from within a particular stratum (group) of the population when creating the sample" (LaerdDissertation, 2011). The advantage of stratified random sampling was that it intensified the likelihood of developing a representative sample. It was based on the key characteristics of individuals in the population included in the same proportions in the sample (LaerdDissertation, 2011).

For example, the researcher used 10 strata by province. The number of 6,128 facilities distributed within the 10 strata is shown in Table 3.1. If the researcher wanted to have 10% of the population as samples, each stratum provided 10% of samples. For example, in the case of Seoul, 150 samples were randomly selected by a random number generator program because 1,496 fitness facilities were located in the Seoul region.

Rea and Parker (2005) presented a guideline to determine a minimum sample size for a population, based on the level of confidence and confidence interval. For this study, with a 95% level of confidence, the guideline recommended that 357 samples for a 5,000 population size and 370 samples for a 10,000 population size could be considered as minimum sample sizes (Rea & Parker, 2005, p. 150).

Consequently, the expected sample size was 613, because 613 samples, as subjects of this study, were sufficient to represent the characteristics of the population. This represented 10% of the health/fitness facility managers in South Korea. The predicted division of samples is shown in Table 3.2.

Table 3.2

Expected Sample Numbers by Province

Province	Expected Number
Seoul	150
Gyeonggi	155
Gangwon	17
Chungcheongbuk	19
Chungcheongnam	43
Gyeongsangbuk	65
Gyeongsangnam	103
Jeollabuk	18
Jeollanam	36
Jeju	7
Total	613

Data Collection

After obtaining approval for the data collection procedure, from the Institutional Review Board (IRB) at the University of New Mexico, data were collected in South Korea by using on-site visits, self-reporting, and a paper and pencil survey to reduce the potential risk of a low response rate. Connaughton et al. (2011) suggested that conducting on-site visits would help improve the objectivity and accuracy and overcome a potential low response rate in future data collection.

In light of the fact that the data were to be collected from every province in South Korea, three professors in sports management programs in South Korea were contacted to obtain undergraduate or graduate students as survey couriers. The couriers delivered and picked up the survey packages. The survey packages included a cover letter describing the purpose of the survey, confidentiality, anonymity, questionnaires, and survey instructions.

Twenty-nine qualified survey couriers, undergraduate or graduate students majoring in sports-related departments in South Korea, assisted in the data collection. All

29 survey couriers were over the age of 20 because a person under the age of 20 is considered a minor in South Korea.

Table 3.3 shows the distribution by province of the 29 survey couriers. Allocation of the couriers was by ratio of the sample size by province. For example, 150 samples were expected from Seoul. Therefore, six survey couriers were allocated to the Seoul region.

Table 3.3

Allocation of the Survey Couriers by Province

Province	Number
Seoul	6
Gyeonggi	6
Gangwon	2
Chungcheongbuk / Chungcheongnam	4
Gyeongsangbuk / Gyeongsangnam	6
Jeollabuk / Jeollanam	3
Jeju	2
Total	29

Survey Instrumentation

Connaughton et al. (2007) conducted a study on automated external defibrillator (AED) implementation and risk management practices among health/fitness club owners and managers in Florida. Recently, Connaughton et al. (2011) carried out another investigation on AED implantation and related risk management practices in high school athletic programs in Florida. The previous survey questions were based on American Heart Association (AHA) (2004) recommendations regarding AED risk management and Florida statutory requirements (Fla. Stat. Ann. §401. 2915; Fla. Stat. Ann. § 768. 1325).

For this study, the survey questionnaire was based on the study by Connaughton et al. (2007). The survey packet was divided into four subdivisions: (a) Background

information, (b) AED knowledge and use, (c) AED implementation and related risk management variables, and (d) perceived constraints related to AED implementation.

Demographic variables, employment and institutional background variables, and AED implementation and related risk management practices variables were measured by a multiple choice and open-ended format. In addition, perceived constraint variables were placed on the 5-point Likert scale from 1 (*no constraint*) to 5 (*very strong constraint*). Questions for the risk management practices associated with AED implementation were based on South Korean statutes. The constraint variables were based on the literature review. In the previous questionnaires, some questions were related to high school settings. The questions related to high school settings were revised for this investigation.

Validity and Reliability

Validity

Connaughton et al. (2011) measured the validity using exploratory factor analysis. Their factor analysis showed five subcategorical factors (e.g., Cost, No Need, Lack of Support, Lack of Information, and Maintenance Concerns) of the perceived constraints to AED implementation (see Table 3.4).

To improve the validity of the survey questions for the Korean study, a pilot test was conducted with risk management experts. Two sport law/risk management professors reviewed the modified survey for this study. The suggestions included wording, structure, readability, and content knowledge. After the review by the two academic researchers, a manager and two practitioners of the Gainesville Health and Fitness Club in Gainesville, Florida, evaluated the modified survey questionnaires. In addition, two South Korean internal medicine department professors at the University of New Mexico Medical

School and a Korean research fellow at the Veterans Hospital in Albuquerque, New Mexico, reviewed the modified survey and the South Korean translated version.

After the comprehensive review, the next step was translation of the English version to the South Korean version because the target population was South Korean health/fitness managers. Three bilingual professors at the University of New Mexico, who are fluent in both English and Korean, reviewed the falsifiability during the translation. As a final step, the researcher received a notarization of both the English and South Korean version of the survey questionnaires from the law firm, Hyndai Law Firm & Notary Office, in South Korea.

Reliability

As shown in Table 3.4, Connaughton et al. (2011) selected Cronbach's alpha value to measure the reliability. The Cronbach's alpha ranged from .85 to .94 to analyze the perceived constraints to AED implementation in Florida high school athletic departments. This alpha value showed statistically significant strong relationships between subcategorized items. To be specific, .93 (Cost), .85 (No Need), .94 (Lack of Support), .92 (Lack of Information), and .93 (Management Concerns) were respectively indicated as appropriate internal consistency to proceed with the study. Table 3.4 shows the perceived constraint variables and their Cronbach's alpha value.

Table 3.4

Internal Consistency Value of Perceived Constraints to AED Implementation

Variable	Questionnaires	Cronbach's Alpha
Cost	Cost of AED Cost of in-service training Cost of certification Cost of maintenance	α = .93
No Need	Proximity of local EMS Perceived low probability of cardiac arrest Medical screening procedures are sufficient CPR alone is adequate	α = .85
Lack of Support	Insurance company Risk manager Legal counsel National professional association Upper school administration Coaching professional organization	α = .94
Lack of Information	Protection from liability Supervisory responsibilities Required certification and training Purpose and function of AEDs Use and operation of AEDs	α = .92
Maintenance Concerns	Staff reluctance Not a current standard practice Fear of litigation Time to implement and train staff in use Difficulty in using an AED Additional staff certification and training Additional supervisory responsibilities Lack of AED instructor availability	α = .93

Source: Connaughton, Spengler, Zhang, and Carroll (2011)

Statistical Analysis

The collected data were analyzed by the Statistical Package for the Social Sciences (SPSS) software for Window Version 18.0. Exploratory Factor Analysis was employed to measure "Perceived Constraints." Chronbach's alpha was used to measure the reliability test among items within subcategorized factors.

For the analysis of demographic profiles, frequency analyses were employed. Chi-square tests and One-way multivariate analysis of variance (MANOVA) tests were applied to examine the various groups' differences of risk management practices associated with AED implementation and perceived constraints for the use of AEDs. The significance level was set at .05.

CHAPTER 4

RESULTS

Data were collected, using a paper and pencil survey, from April 20, 2012, to April 30, 2012, in South Korea. Data were then entered into the Statistical Package for the Social Sciences (SPSS) software 18.0 version. In this chapter, descriptive statistics are employed to examine the characteristics of the South Korean health/fitness facilities. In addition, the findings for each research question are addressed by using frequency tests, t-tests, Chi Square tests, and multivariate analysis of variance (MANOVA) statistics. A Chi-Square analysis was not calculated when the expected value was less than 5. All tests were 2-tailed with the alpha level set at .05.

Background Information of Study Participants

The 613 health/fitness facilities were selected at random from within a stratified sample created by the distribution of subjects within the South Korean provinces. The number and percentage of total facilities within each South Korean province was identified. Of the 613 selected health/fitness facility managers contacted, 436 agreed and participated in the study survey. The total survey response rate was approximately 71%. All survey questionnaires were self-reported by the participants.

Table 4.1 presents the frequencies and percentage distributions of the 436 participants for the following background variables: facility location, ownership, number of members in the facility, manager's knowledge regarding AED legislation, AED implementation, manager's certification, pre-activity medical screening, and gender.

Table 4.1

Frequency Distribution of Participants' Background Information

	Facility managers (n = 436)			Facility managers (n = 436)	
	N	%		*n*	%
Location			Knowledge		
Seoul	109	25.0	Specific provisions	13	3.0
Gyeonggi	95	21.8	Basic concepts	70	16.1
Chungcheongbuk	13	3.0	Law existence	159	36.5
Chungcheongnam	27	6.2	No knowledge	194	44.5
Gyeongsangbuk	52	11.9			
Gyeongsangnam	86	19.7	Certification		
Gangwon	10	2.3	CPR	71	16.3
Jeollabuk	15	3.4	AED	5	1.1
Jeollanam	24	5.5	None	351	82.2
Jeju	5	1.1	No response	9	2.1
Ownership			Medical Screening		
Private owned	361	82.8	Over age 50	39	8.9
Non-profit organization	28	6.4	High blood pressure	320	73.4
Local government owned	24	5.5	High cholesterol	173	39.7
Domestic fitness chain	14	3.2	Diabetes	272	62.4
Hotel/accommodation	7	1.6	Sedentary lifestyle	162	37.2
International fitness chain	2	.5	Heart disease	163	37.4
			Family heart disease history	36	8.2
Members					
Less than 300	124	28.4			
300-500	179	41.1	Gender		
501-1,000	82	18.8	Male	393	90.1
1,001-3,000	44	10.1	Female	43	9.9
Over 3,000	7	1.6			

Facility Location

Surveys were returned from 613 participants. As shown in Table 4.2, even though the expected sample number was not obtained (10% of the population from each province), the response rates ranged from 61% (Gyeonggi) to 84% (Gyeongsangnam). A total of 436 participants, with a response rate of 71%, were sufficient to generalize the outcome of the survey (Rea & Parker, 2005, p. 150). Discrepancies between the frequencies expected and those actually obtained can be seen in Table 4.2.

Table 4.2

Frequency Distribution of Participants and Response Rate by Location

Variable	Participants		Response Rate (%)
	Expected *n*	Responded *n*	
Seoul	150	109	73
Gyeonggi	155	95	61
Chungcheongbuk	19	13	68
Chungcheongnam	43	27	63
Gyeongsangbuk	65	52	80
Gyeongsangnam	103	86	84
Gangwon	17	10	59
Jeollabuk	18	15	83
Jeollanam	36	24	67
Jeju	7	5	71
Total	613	436	71

Ownership

Of the 436 participants, as shown in Table 4.1, the demographic breakdown included the following types of self-identified managers: 361 (82.8%) were privately owned facility managers; 28 (6.4%) were non-profit organization facility managers; 24 (5.5%) were managers of a facility owned by the local government; 14 (3.2%) were Korean domestic health/fitness chain facility managers; seven (1.6%) were managers of a facility owned by a hotel or other accommodation; and two (.5%) were international health/fitness chain facility managers.

Number of Members in the Facility

Of the 436 participants, as shown in Table 4.1, the demographic classification included the following total numbers of members: 124 (28.4%) worked at facilities with fewer than 300 members; 179 (41.1%) worked at facilities with membership ranging from 300 to 500; 82 (18.8%) worked at facilities with membership ranging from 501 to 1,000; and 44 (10.1%) worked at facilities with membership ranging from 1,001 to 3,000.

Only seven (1.6%) worked at facilities with more than 3,000 members.

Manager's Knowledge Regarding AED Legislation

As shown in Table 4.1, of the 436 participants, 13 (3%) respondents had knowledge about specific provisions of AED legislation, 70 (16%) understood the basic concepts of the AED law, 159 (36.5%) knew about the existence of the law associated with AEDs, and 194 (44.5%) had no knowledge of AED legislation.

Manager's Certification

Most participants had "no certification" (n = 351, 82.2%), as compared to those who had "CPR certification" (n = 71, 16.3%) and "AED certification" (n = 5, 1.1%). Nine participants did not indicate if they had certification. The participants did not have other certifications associated with emergency preparedness and response, including Basic Life Support (BLS) and/or Advanced Cardiovascular Life Support (ACLS).

Pre-Activity Medical Screening

The majority of respondents (n = 320, 73.4%) checked the blood pressure of new members when enrolling in their facilities. Also, 62% (n = 272) of the facilities indicated that they inquired about diabetes. A member's family heart disease history was the lowest concern of the managers (n = 36, 8.2%).

Gender

The sample consisted of 436 health/fitness managers, with many more males (n = 393, 90.1%) than females (n = 43, 9.9%). Males occupied the health/fitness facility manager position with a noticeably higher percentage.

Research Question 1

What is the status of AED implementation in South Korean health/fitness facilities?

Status of AED Implementation

The frequency distribution scores of the status of AED implementation are shown in Table 4.3. As indicated, 398 of the 436 (91.3%) managers reported no AED(s) in their health/fitness facilities. Only 38 (8.7%) managers reported that their facilities had one or more AEDs.

Table 4.3

Frequency Distribution of Status of AED Implementation

No AED	Have AEDs			
(%)	1 AED (%)	2 AEDs (%)	3 AEDs (%)	Total
398	32	5	1	436
(91.3%)	(7.3%)	(1.2%)	(1.2%)	(100%)

Facility Location and AED Implementation

As shown in Table 4.4, 38 managers had at least one AED in their facility. Of those facilities, 20 were located in Seoul (52.6%); four in Gyeonggi (10.6%); seven in Gyeongsangbuk (18.5%); six in Gyeongsangnam (15.8%); and one was in Jeju (2.6%).

Ownership and AED Implementation

Privately owned facilities (36.8%), non-profit organization health/fitness facilities (23.7%), and facilities owned by local government (23.7%) were more likely to have an AED than facilities owned by domestic or international fitness chains.

Table 4.4

Frequency Distribution of Participants by Status of AED Implementation

	AED Implementation (n = 38)			AED Implementation (n = 38)	
	n	%		*n*	%
Location			Knowledge		
Seoul	20	52.6	Specific provisions	6	15.8
Gyeonggi	4	10.6	Basic concepts	22	57.9
Chungcheongbuk	0	0	Law existence	10	26.3
Chungcheongnam	0	0	No knowledge	0	0
Gyeongsangbuk	7	18.5			
Gyeongsangnam	6	15.8	Certification		
Gangwon	0	0	CPR	25	65.7
Jeollabuk	0	0	AED	5	13.2
Jeollanam	0	0	None	8	21.1
Jeju	1	2.6			
Ownership			Gender		
Privately owned	14	36.8	Male	31	81.6
Non-profit organization	9	23.7	Female	7	18.4
Local government owned	9	23.7			
Domestic fitness chain	1	2.6			
Hotel/accommodation	4	10.5			
International fitness chain	1	2.6			
Members					
Less than 300	5	13.2			
300-500	5	13.2			
501-1,000	23	60.5			
1,001-3,000	4	10.5			
Over 3,000	1	2.6			

Number of Members and AED Implementation

The 38 facilities found to have one or more AEDs were divided into five subcategories: five (13.2%) had less than 300 members; five (13.2%) had 300 to 500 members; 23 (60.5%) had 501 to 1,000 members; four (10.5%) had 1,001 to 3,000 members; and one (2.6%) had more than 3,000 members (see Table 4.4).

Manager's Knowledge Regarding AED Legislation and AED Implementation

As can be seen by the frequencies in Table 4.4, of the 38 participants who reported that their facility had at least one AED, 10 (26.3%) of the respondents knew the existence of the law associated with AEDs, 22 (57.9%) understood the basic concepts of AED law, and six (15.8%) had knowledge about specific provisions of AED legislation.

Certification and AED Implementation

Of the 436 study participants, nine participants did not answer this question. A Chi-square test was performed and a statistically significant relationship was found between a manager's certification and AED implementation in his or her health/fitness facility, χ^2 (1, n = 427) = 106.604, $p < .01$, as shown in Table 4.5. As expected, managers who had certifications associated with emergency preparedness and response, such as CPR or AED, had a higher percentage of AED implementation than those who were not certified. Every facility in which the manager had an AED certification was using at least one AED, as shown in Table 4.4.

Table 4.5

Results of Certification and AED Implementation Cross Tabulation

		AED		
Variable		Have AEDs	No AED	χ^2/p
No	Observed N	8	343	
	Expected N	31.2	319.8	106.604
With certification	Observed N	30	46	$p < .01$
	Expected N	6.8	69.2	

Gender and AED Implementation

As can be seen by the frequencies in Table 4.4, of the 38 managers, 31 were males (81.6%) and seven (18.4%) were females. A Chi-Square analysis could not be calculated because the expected value in the category ("Female" and "Have AEDs") was less than five.

Interest about AED Implementation

The frequency distribution scores of those interested in learning more about AEDs are shown in Table 4.6. As indicated, 255 of the 436 (59%) facility managers reported no interest in learning about AEDs, while 181 (42%) facility managers reported an interest in learning about AEDs. The managers reported they were more interested in learning about the effectiveness (90%) and costs (89%) of AEDs rather than the purpose of AED usage (74%), manufacture/retailer information (79%), or training issues associated with AED implementation (81%).

Table 4.6

Frequency Distribution of Participants by Interest in AED Implementation

	Variable	Number	Percent
	Effectiveness	163	90
	Purpose	133	73.5
	Training	146	80.6
Yes	Costs	161	89
	Liability associated with use AEDs	151	83.4
	Manufacture/retailer information	142	78.4
	Sub-total	181	41.5
No		255	58.5
Total		436	100

Research Question 2

For health/fitness facilities with automated external defibrillators (AEDs), what risk management practices are associated with AED implementation?

Period of AED Implementation

Of the 436 South Korean health/fitness facility managers, 38 managers (8.7%) responded that their facilities had one or more AEDs. Thirty-seven managers answered Research Question 2; one manager did not answer this question.

The frequency distribution scores of the period of AED implementation are shown in Table 4.7. Six (15.8%) managers reported their AED implementation period as less than 1 year; 14 (36.8%) reported their AED implementation period as 1-2 years; 14 (36.8%) reported their AED implementation period as 2-3 years; and three (7.9%) reported their AED implementation period as over 3 years.

Trained Staff and AED Implementation

The frequency distribution scores of AED trained staff members are shown in Table 4.7. As indicated, 25 of the 38 (65.8%) facility managers reported that at least one or more AED trained staff members were employed in their health/fitness facilities. Thirteen (34%) managers reported no trained staff members in their facilities even though they had AEDs. On the other hand, 22 facilities, which did not have AEDs, had at least one trained staff member, as shown in Table 4.8.

Table 4.7

Frequency Distribution of Participants in AED Implementation

AED Implementation (n = 38)			AED Implementation (n = 38)		
	n	%		*n*	%
Period			EAP Training		
< 1 year	6	15.8	No training	7	18.4
1-2 years	14	36.8	Every 12 months	6	15.8
2-3 years	14	36.8	Every 6 months	9	23.7
>3years	3	7.9	Every 3 months	2	5.3
No response	1	2.6	Every 2 months	1	2.6
			Every month	13	34.2
Trained Staff			EMS to Facility		
Yes	25	65.8	< 3 minutes	11	28.9
No	13	34.2	3-5 minutes	11	28.9
			5-7 minutes	6	15.8
On-duty Staff (n = 25)			7-10 minutes	6	15.8
Yes	17	68	>10 minutes	4	10.5
No	8	32			
			Facility Distance to Hospital		
Staff Training			< 3 minutes	6	15.8
No training	6	15.8	3-5 minutes	10	26.3
Every 12 months	7	18.4	5-7 minutes	5	13.2
Every 6 months	11	28.9	7-10 minutes	14	36.8
Every 3 months	1	2.6	>10 minutes	3	7.9
Every 2 months	1	2.6			
Every month	12	31.6	Use of AED in Emergency		
			Yes	4	10.5
Emergency Action Plan			No	34	89.5
Yes	31	81.6			
No	7	18.4			

Table 4.8

Frequency Distribution of Participants by Trained Staff Members in AED Implementation

	AED		
Variable	Have AEDs	No AED	Total
Trained Staff	25	22	47
No Trained Staff	13	375	388
Total	38	397	435

On-duty Trained Staff Members

Of the 47 facilities (25 facilities with AEDs and 22 facilities without AED) that had at least one staff member trained to use AEDs in an emergency situation, as shown in Table 4.9. Twenty four facilities (51%) (17 with AEDs and seven without AEDs) indicated that a current AED trained staff member(s) was on-duty during all of the facility's business hours. As indicated in Table 4.7 and Table 4.9, only 17 facilities provided both AEDs and trained staff members who could utilize an AED in an emergency situation during all of their business hours.

Table 4.9

Frequency Distribution of Participants by On-duty AED Trained Staff Members

	AED		
Variable	Have AEDs	No AED	Total
On-duty staff	17	7	24
No on-duty staff	8	15	23
Total	25	22	47

Staff Training with AED Implementation

As shown in Table 4.7, of the 38 facilities that had implemented an AED program, six (15.8%) offered no AED training to their staff; seven (18.4%) offered training every year; 11 (28.9%) offered training every 6 months; one (2.6%) offered training every 3 months; one (2.6%) offered training every 2 months; and 12 (31.6%) offered training every month. As indicated in Table 4.1, the facilities with AED implementation were located in only five provinces: Seoul, Gyeonggi, Gyeongsangbuk, Gyeongsangnam, and Jeju. The results of staff training by those provinces are presented in Table 4.10.

Table 4.10

Frequency Distribution of Staff Training for AED by Province

	n	%		*n*	%
Seoul (*n* = 20)			Gyeongsangbuk (*n* = 7)		
No training	4	20	No training	0	0
Every 12 months	4	20	Every 12 months	1	14.3
Every 6 months	7	35	Every 6 months	0	0
Every 3 months	1	5	Every 3 months	0	0
Every 2 months	0	0	Every 2 months	0	0
Every month	4	20	Every month	6	85.7
Gyeonggi (*n* = 4)			Gyeongsangnam (*n* = 6)		
No training	2	50	No training	0	0
Every 12 months	1	25	Every 12 months	0	0
Every 6 months	0	0	Every 6 months	2	33.3
Every 3 months	0	0	Every 3 months	1	16.7
Every 2 months	0	0	Every 2 months	1	16.7
Every month	1	25	Every month	2	33.3
Jeju (*n* = 1)					
No training	1	100			
Every 12 months	0	0			
Every 6 months	0	0			
Every 3 months	0	0			
Every 2 months	0	0			
Every month	0	0			

Emergency Action Plan and Practice

As shown in Table 4.7, 31 (81.6%) of the 38 managers reported an Emergency Action Plan in place in their facilities; seven (18.4%) reported no Emergency Action Plan in place. In terms of practices their Emergency Action Plans, 13 (34.2%) of the 31 facilities had a practice session every month; one (2.6%) had a practice session every 2 months; two (5.3%) had a practice session every 3 months; nine (23.7%) had a practice session every 6 months; six (15.8%) had a practice session every 12 months; and seven (18.4%) had no practice sessions.

Time from Local Emergency Medical Services (EMS) to Facilities

The 38 managers answered a question concerning the approximate response time required by EMS to reach their facilities in an emergency situation. As presented in Table 4.7, 11 (28.9%) reported that local EMS personnel could arrive at their facilities within 3 minutes; 11 (28.9%) reported arrival between 3 and 5 minutes; six (15.8%) reported arrival between 5 and 7 minutes; six (15.8%) reported arrival between 7 and 10 minutes; and four (10.5%) reported arrival at their facilities after 10 or more minutes.

Time from Facilities to the Nearest Hospital Emergency Room

The 38 managers answered a question concerning the approximate time from their facilities to the nearest hospital emergency room. As indicated in Table 4.7, six (15.8%) managers reported that local EMS could arrive at the nearest hospital from their facilities within 3 minutes; 10 (26.3%) reported arrival between 3 and 5 minutes; five (13.2%) reported arrival between 5 and 7 minutes; 14 (36.8%) reported arrival between 7 and 10 minutes; and three (7.9%) reported arrival after 10 or more minutes.

Use of AEDs in Emergency Situations

Of the 436 facilities, six incidents of sudden cardiac arrest (SCA) were reported. In four of those six SCA emergency incidents, as shown in Table 4.7, AEDs were utilized in the facilities. For the other two SCA emergency incidents, an AED was not utilized. The analysis of the four incidents by various facility characteristics is reported in Table 4.11. Three incidents were in Seoul and one was in the Gyeongsangnam province. Three facilities were owned by non-profit organizations and one was owned by local government. Three incidents occurred in the facilities that had 501 to 1,000 members, and one was in a facility with more than 3,000 members. One facility manager, in a recent

emergency situation, knew the specific provisions of AED laws, two managers understood the basic concepts of AED laws, and one was aware of the existence of AED laws. Three of the four facility managers had CPR certifications and one had an AED certification. Four recent emergency situations occurred in facilities that had an Emergency Action Plans in place. Two of those facilities practiced their Emergency Action Plan every month; the other two facilities practiced their emergency action plan every 12 months. The EMS arrival times for three of the four incidents were within 5 minutes, and one was within 7 minutes. Three of the four facilities were located within 5 minutes from the nearest hospital emergency room, and one was located within 10 minutes from the nearest hospital emergency room.

Table 4.11

Analysis of Recent Incidents of AED Use

	n	%		*n*	%
Location			EAP Training		
Seoul	3	75	Every 12 months	2	50
Gyeongsangnam	1	25	Every month	2	50
Ownership			Medical Screening		
Non-profit	3	75	Over age 50	2	50
Local government owned	1	25	High blood pressure	3	75
			High cholesterol	2	50
Members			Diabetes	1	25
501-1,000	3	75	Heart disease	2	50
Over 3,000	1	25	Family heart disease history	1	25
Knowledge			EMS to Facility		
Specific provisions	1	25	3-5 minutes	3	75
Basic concepts	2	50	5-7 minutes	1	25
Law existence	1	25			
Certification			Facility Distance to Hospital		
CPR	3	75	3-5 minutes	3	75
AED	1	25	7-10 minutes	1	25
Emergency Action Plan					
Yes	4	100			
No	0	0			

Research Question 3

For facilities without AEDs, what constraints influence AED implementation?

Exploratory Factor Analysis

A factor analysis was conducted to identify constraints to AED implementation for managers in South Korean health/fitness facilities. A principal components analysis, with a Varimax (orthogonal) rotation of the 26 Likert scale questions from the constraints of AED implementation survey questionnaire, was conducted on data gathered from 436 participants. An examination of the Kaiser-Meyer-Olkin measure of sampling adequacy suggested that the sample was factorable (KMO = .930), above the commonly recommended value of .6, and Bartlett's test of sphericity was significant (χ^2 (325) = 8050.88, $p < .01$).

Given these overall indicators, a factor analysis was deemed to be suitable with all 26 items. The results of an orthogonal rotation of the solution are shown in Table 4.12. When loadings less than 0.50 were excluded, the analysis yielded five factors. Because the constraints were similar to those found in the study of Connaughton et al. (2007), the same names were applied to identify them. As seen in Table 4.12 and Table 4.13, the five constraints were identified as: (1) Cost, (2) No Need, (3) Lack of Support, (4) Lack of Information, and (5) Management Concerns.

Table 4.12

Obliquely Rotated Component Loading for 26 Survey Items

Component	1	2	3	4	5
17 Purpose and function of an AED	**.795**	.244	.108	.171	.124
14 Protection from liability	**.792**	.242	.218	.082	.202
15 Supervisory responsibility	**.744**	.314	.236	.008	.179
16 Required certification and training	**.729**	.388	.257	.040	.105
18 Use and operation of an AED	**.726**	.370	.209	.126	.110
22 Time to implement and train staff in use	.238	**.727**	.078	.014	.155
21 Fear of litigation	.112	**.721**	.177	.080	.119
23 Difficulty in using an AED	.328	**.721**	.118	.112	.147
25 Additional supervisory responsibilities	.247	**.668**	.269	.067	.254
24 Additional staff certification and training	.419	**.658**	.141	-.038	.159
26 Lack of AED instructor	.500	**.585**	.183	.083	.166
19 Staff reluctance	.336	**.580**	.277	.193	.010
20 Not a current standard practice	.534	**.549**	.240	.165	-.018
2 Cost of in-service training	.290	.234	**.854**	.085	.118
4 Cost of maintenance	.276	.241	**.842**	.049	.141
1 Cost of AED	.157	.107	**.809**	.042	.220
3 Cost of certification	.173	.307	**.808**	.041	.181
6 low probability of cardiac arrest for members	.224	-.058	.009	**.823**	.003
7 Pre-activity screening procedures are sufficient	.059	.058	.160	**.819**	.016
8 CPR alone is adequate	-.038	.208	.081	**.812**	-.020
5 Proximity of local EMS	.218	-.043	.058	**.783**	.066
9 Protection offered by waiver	-.064	.154	-.094	**.614**	.146
12 Local counsel	.468	.162	.263	.041	**.680**
11 Risk manager	.212	.396	.250	.017	**.666**
10 Insurance company	-.062	.467	.165	.086	**.618**
13 Upper management or owner	.441	.012	.237	.217	**.586**
Eigenvalues	10.854	2.890	1.835	1.480	1.105
Percentage of total variance	41.746	11.114	7.059	5.691	4.248
Number of test measures	5	8	4	5	4

Component 1- Lack of Information; 2-Management Concerns; 3-Cost; 4-No Need; 5-Lack of Support

The Five Constraints

As presented in Table 4.12, four items (questions 1, 2, 3, and 4) were loaded onto the first constraint labeled "Cost." These four items were related to cost concerns in AED implementation. Five items (questions 5, 6, 7, 8, and 9) were loaded onto the second constraint labeled "No Need." Those five items were related to not needing AED implementation because alternatives were in place to prepare for an SCA incident. Four items (questions 10, 11, 12, and 13) were loaded onto the third constraint labeled "Lack of Support." Those four items were related to the lack of support for AED implementation from third parties, including insurance companies, local government, and facility owners. Five items (questions 14, 15, 16, 17, and 18) were loaded onto the fourth constraint labeled "Lack of Information." Those five items covered the lack of information regarding AED education, purpose and function of AEDs, certification, operation, and liability for AED implementation. Eight items (questions 19, 20, 21, 22, 23, 24, 25, and 26) were loaded onto the fifth constraint labeled "Management Concerns." Those eight items were related to management issues to AED implementation, including the provision of staff training, practice, and supervision of AED programs.

Reliability Test

The Cost subscale consisted of four items ($\alpha = .93$), and the No Need subscale consisted of four items ($\alpha = .84$). Cronbach's alphas for the five Lack of Support and five Lack of Information items were .79 and .92, respectively. The Management Concerns subscale was found to be highly reliable (8 items; $\alpha = .90$), as shown in Table 4.13.

Table 4.13

Results of Internal Consistency Value of Five Factors

Factor	Component	Reliability	
		Alpha if item deleted	Cronbach α
Cost	1 Cost of AED	.935	.93
	2 Cost of in-service training	.885	
	3 Cost of certification	.909	
	4 Cost of maintenance	.891	
No Need	5 Proximity of local EMS	.802	.84
	6 Low probability of cardiac arrest for members	.788	
	7 Pre-activity screening procedures are sufficient	.792	
	8 CPR alone is adequate	.794	
	9 Protection offered by waiver	.857	
Lack of Support	10 Insurance company	.786	.79
	11 Risk manager	.695	
	12 Local counsel	.676	
	13 Upper management or owner	.768	
Lack of Information	14 Protection from liability	.902	.92
	15 Supervisory responsibility	.905	
	16 Required certification and training	.903	
	17 Purpose and function of an AED	.910	
	18 Use and operation of an AED	.911	
Management Concerns	19 Staff reluctance	.896	.90
	20 Not a current standard practice	.891	
	21 Fear of litigation	.900	
	22 Time to implement and train staff in use	.894	
	23 Difficulty in using an AED	.886	
	24Additional staff certification and training	.890	
	25 Additional supervisory responsibilities	.890	
	26 Lack of an AED instructor	.889	

Constraints to AED Implementation

As shown in Table 4.14, the 398 facility managers, who did not have an AED(s) in their facilities, reported their overall perceived constraints to AED implementation through a 5-point Likert scale ranging from 1 (*no constraint*) to 5 (*very strong constraint*). The five highest constraints were: (1) Lack of information about required certification and training for AED implementation (M = 4.05); (2) Lack of an AED instructors (M = 4.04); (3) Lack of information about supervisory responsibility (M = 4.02); (4) Lack of information about protection from liability with AED implementation (M = 3.99); and (5) Additional staff certification and training (M = 3.95).

The five lowest constraints for AED implementation in South Korean health/fitness facilities involved "No Need": (1) Protection offered by waiver (M = 2.70); (2) Pre-activity screening procedures are enough (M = 2.82); (3) CPR alone is adequate (M= 2.89); (4) Proximity of local EMS (M = 3.05); and (5) Low probability of cardiac arrest for members (M = 3.07).

Table 4.14

Descriptive Statistics for Perceived Constraints for AED Implementation Variables

Variable	Response % 1	2	3	4	5	*M*	*SD*
1 Cost of AED	1.3	3.3	25.6	46.7	23.1	3.87	.85
2 Cost of in-service training	1.8	4.8	27.9	45.2	20.4	3.78	.89
3 Cost of certification	2.3	5.3	25.4	45.7	21.4	3.79	.92
4 Cost of maintenance	1.8	4.3	28.6	45.7	19.6	3.77	.87
5 Proximity of local EMS	7.8	21.1	37.4	25.9	7.8	3.05	1.05
6 Low probability of cardiac arrest for members	4.5	23.1	39.7	25.9	6.8	3.07	.97
7 Pre-activity screening procedures are sufficient	7.0	28.1	43.7	18.1	3.0	2.82	.91
8 CPR alone is adequate	8.0	23.4	44.2	20.6	3.8	2.89	.95
9 Protection offered by waiver	11.6	29.6	40.5	14.3	4.0	2.70	.99
10 Insurance company	2.3	6.0	29.4	47.7	14.6	3.66	.88
11 Risk manager	1.3	5.3	35.7	40.2	17.6	3.68	.87
12 Local counsel	.8	2.5	26.9	46.5	23.4	3.89	.81
13 Upper management or owner	1.8	8.8	37.2	32.4	19.8	3.60	.96
14 Protection from liability	.5	6.5	14.3	51.0	27.6	3.99	.85
15 Supervisory responsibility	0	3.0	20.4	48.2	28.4	4.02	.78
16 Required certification and training	.3	1.3	17.6	55.0	25.9	4.05	.71
17 Purpose and function of an AED	.8	3.8	23.9	51.5	20.1	3.86	.80
18 Use and operation of an AED	.8	3.5	25.1	48.5	22.1	3.88	.82
19 Staff reluctance	4.0	10.3	21.9	42.7	21.1	3.67	1.05
20 Not a current standard practice	1.5	4.0	27.9	48.0	18.6	3.78	.85
21 Fear of litigation	6.5	17.3	35.7	25.1	15.3	3.25	1.11
22Time to implement and train staff in use	1.5	5.8	27.9	43.7	21.1	3.77	.90
23 Difficulty in using an AED	4.0	7.5	33.2	37.2	18.1	3.58	1.00
24Additional staff certification and training	.5	3.5	22.1	48.5	25.4	3.95	.81
25 Additional supervisory responsibilities	1.3	9.5	26.1	42.5	20.6	3.72	.94
26 Lack of an AED instructor	1.0	2.5	19.6	45.7	31.2	4.04	.84

Note: 1-No constraint, 2-Slight constraint, 3-Moderate constraint, 4-Strong constraint, 5-Very strong constraint

Facility Location and Perceived Constraints

A one-way multivariate analysis of variance was conducted to examine the effect of the independent variable, location, on five dependent variables: constraints to AED implementation. Table 4.15 presents the overall means and standard deviations for the five constraints by location.

Table 4.15

Means and Standard Deviations for Location and Constraints to AED Implementation

	Location									
	Seoul (n = 89)		Gyeonggi (n = 91)		Chungcheongbuk (n = 13)		Chungcheongnam (n = 27)		Gyeongsangbuk (n = 45)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Cost	3.74	.76	3.59	.70	3.54	.86	3.84	.46	4.20	.74
No Need	2.82	.72	2.76	.60	2.86	.24	3.24	.64	2.92	.85
Lack of Support	3.69	.66	3.53	.60	3.37	.63	4.10	.59	3.78	.68
Lack of Information	4.00	.73	3.79	.68	3.63	.80	4.18	.50	4.13	.53
Management Concerns	3.76	.65	3.54	.67	3.23	.63	3.83	.47	3.87	.80

	Location									
	Gyeongsangnam (n = 80)		Gangwon (n = 10)		Jeollabuk (n = 15)		Jeollanam (n = 24)		Jeju (n = 4)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Cost	3.84	.99	4.08	.61	3.63	.62	4.16	.79	3.19	.24
No Need	3.06	.84	2.62	.88	2.77	.86	3.03	.81	3.40	.37
Lack of Support	3.80	.71	4.08	.59	3.38	.91	3.85	.71	3.31	.13
Lack of Information	3.98	.72	4.10	.59	3.81	.53	4.11	.60	3.70	.16
Management Concerns	3.77	.88	4.18	.65	3.66	.57	3.81	.52	3.38	.31

Exploratory data analyses examined the assumptions for MANOVA. Box's M test was significant, indicating a violation for the assumption of homogeneity of variance-covariance matrices. Three constraint variables (Cost, No Need, and Management Concerns) of Levene's test of equality of error variances values were less than .05, indicating equal variance not assumed.

The multivariate result using the Wilks' Lambda criterion was significant, Wilks Lambda = .817, F (45, 1721) = 1.77, $p < .01$, indicated differences among groups in constraints to AED implementation. The univariate F tests examined a significant difference among groups for Cost, F (9, 388) = 3.35, $p < .01$, and for Lack of Support, F (9, 388) = 3.39, $p < .01$. However, the F values were not significant for No Need, F (9, 388) = 2.03, $p > .01$; for Lack of Information, F (9, 388) = 2.06, $p > 01$; and for Management Concerns, F (9, 388) = 2.18, $p > .01$ (see Table 4.16).

Table 4.16

The Results of the Univariate ANOVAs

	Constraints to AED Implementation	*SS*	*df*	*MS*	*F*	*p*
Location	Cost	18.14	9	2.02	3.35*	.00
	No Need	9.88	9	1.10	2.03	.04
	Lack of Support	13.57	9	1.51	3.39*	.00
	Lack of Information	8.17	9	.91	2.06	.03
	Management Concerns	9.82	9	1.09	2.18	.02

*$p < .01$

As presented in Table 4.16, post hoc Dunnett T3 procedures for Cost were used to examine the comparison represented by the groups because Levene's test of equality of

error variances values for those were less than .05. Post hoc Bonferroni procedures for Lack of Support were used to examine the comparison of the groups by location. For Cost, managers who worked in Gyeongsangbuk had a higher concern related to cost for AED implementation than those who worked in facilities in Gyeonggi or Jeju Province. Also, the managers who worked in Jeollanam had a higher concern for cost than the managers who worked in Jeju Province. Under Lack of Support, the managers who worked in facilities in Chungcheongnam had a higher concern about lack of support for AED implementation than those managers who worked in facilities in Gyeonggi, as shown in Table 4.17.

Table 4.17

Post Hoc Test Results Regarding Cost and Lack of Support by Location

		Variable	Observed Mean Difference	*p*	*F*
Cost					3.35*
	Gyeongsangbuk	Gyeonggi	.61*	.00	(Gyeongsangbuk
		Jeju	1.00*	.00	>Gyeonggi, Jeju)
	Jeollanam	Jeju	.97*	.00	(Jeollanam>Jeju)
Lack of Support					3.39*
	Chungcheongnam	Gyeonggi	.57*	.00	Chungcheongnam >Gyeonggi

*$p < .01$

Ownership and Perceived Constraints

A one-way multivariate analysis of variance was conducted to examine the effect of the independent variable of ownership of a facility on five dependent variables: constraints to AED implementation. Table 4.18 describes the overall means and standard deviations for the five factors by ownership. Because one case cannot be examined by the

mean difference of groups by ownership, the international fitness chain variable (n = 1) was removed to conduct the MANOVA test.

Table 4.18

Means and Standard Deviations for Ownership and Constraints to AED Implementation

	Ownership									
	Privately owned (n = 347)		Domestic fitness chain (n = 13)		Non-profit organization (n = 19)		Local government owned (n = 15)		Hotel/ accommodation (n = 3)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Cost	3.89	.78	3.25	.65	3.08	.80	3.35	.47	3.25	.25
No Need	2.94	.72	2.98	.70	2.56	.85	2.47	1.06	3.07	.61
Lack of Support	3.74	.68	3.38	.69	3.64	.70	3.27	.60	3.25	.25
Lack of Information	4.01	.64	3.71	.58	3.62	1.05	3.65	.73	3.40	.40
Management Concerns	3.76	.69	3.28	.66	3.57	1.08	3.53	.63	3.00	.72

Exploratory data analyses revealed that one of the assumptions for MANOVA was not satisfied. Box's M test was significant, indicating a violation of homogeneity assumption of variance-covariance matrices. In terms of Levene's test of equality of error variances values, No Need, Lack of Information, and Management Concerns were less than .05.

The multivariate analysis of variance result using the Wilks' Lambda criterion was significant, Wilks Lambda = .859, $F(20, 1288) = 3.01$, $p < .01$, indicated differences among groups by ownership in constraints to AED implementation. The univariate F tests examined a significant difference among groups for Cost, F (4, 392) = 8.63, $p < .01$; for No Need, F (4, 392) = 2.60, $p < .05$; for Lack of Support, F (4, 392) = 2.95, p < .05; for

Lack of Information, F (4, 392) = 3.46, $p < .05$; and for Management Concerns, F (4, 392) = 2.71, $p < .05$ (see Table 4.19).

Table 4.19

The Results of the Univariate ANOVAs

	Constraints to AED implementation	*SS*	*df*	*MS*	*F*	*p*
Ownership	Cost	20.37	4	5.09	8.63*	.00
	No Need	5.69	4	1.42	2.60	.04
	Lack of Support	5.40	4	1.35	2.95	.02
	Lack of Information	6.13	4	1.53	3.46	.01
	Management Concerns	5.46	4	1.37	2.71	.03

*$p < .01$

Post hoc Bonferroni procedures were used to examine the comparison represented by the groups. For Cost, a significant difference occurred between the mean of the privately owned facilities and the mean of the facilities owned by a non-profit organization. That is, the managers who worked in privately owned facilities (M = 3.89, SD = .78) had a higher concern for cost issue of AED implementation than those who worked in a non-profit organization (M = 3.08, SD = .80) (see Table 4.20). However, no statistical significant group difference occurred by ownership to the other constraint variables.

Table 4.20

Bonferroni Post Hoc Test Results Regarding Cost and Type of Facility Ownership

	Variable	Observed Mean Difference	*p*	*F* (Bonferroni)
Private	Domestic fitness chain	.64	.04	
	Non-profit	.81*	.00	
	Government	.54	.08	
	Hotel/accommodation	.64	1.00	
Domestic fitness chain	Private	-.64	.04	
	Non-profit	.17	1.00	
	Government	-.10	1.00	
	Hotel/accommodation	.00	1.00	
Non-profit	Private	-.81*	.00	8.63*
	Domestic fitness chain	-.17	1.00	
	Government	-.27	1.00	(Private >
	Hotel/accommodation	-.17	1.00	Non-profit)
Government	Private	-.54	.08	
	Domestic fitness chain	.10	1.00	
	Non-profit	.27	1.00	
	Hotel/accommodation	.10	1.00	
Hotel/ accommodation	Private	-.64	1.00	
	Domestic fitness chain	.00	1.00	
	Non-profit	.17	1.00	
	Government	-.10	1.00	

*$p < .01$, Bonferroni results appear in parentheses under *F* value.

Number of Members and Perceived Constraints

A one-way multivariate analysis of variance (MANOVA) was conducted to examine the effect of the independent variable of number of members on five dependent variables: constraints to AED implementation. Table 4.21 presented the overall means and standard deviations for the five constraints according to number of members.

Table 4.21

Means and Standard Deviations for Number of Members and Constraints to AED Implementation

	Number of Members									
	Less than 300 (n = 119)		300 - 500 (n = 174)		501 - 1,000 (n = 59)		1,001- 3,000 (n = 40)		Over 3,000 (n = 6)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Cost	4.00	.79	3.81	.78	3.35	.75	3.78	.72	4.20	.68
No Need	2.99	.77	2.88	.73	2.98	.72	2.74	.74	2.43	.75
Lack of Support	3.87	.69	3.70	.71	3.56	.58	3.51	.64	3.46	.58
Lack of Information	4.08	.64	3.90	.69	3.89	.61	3.97	.80	4.00	.49
Management Concerns	3.94	.72	3.67	.70	3.45	.68	3.61	.66	3.65	.69

Exploratory data analyses revealed that the assumptions for MANOVA were not violated. Box's M test was not significant, indicating no violation for the assumption of homogeneity of variance-covariance matrices. None of Levene's test of equality of error variances values was less than .05.

The multivariate result using the Wilks' Lambda value was significant, Wilks Lambda = .858, $F(20, 1291) = 3.06$, $p < .01$, indicated differences among groups in constraints to AED implementation. The univariate F tests examined a significant difference among groups for Cost, F (4, 393) = 7.51, $p < .01$; for Lack of Support, F (4, 393) = 3.47, $p < .01$; and for Management Concerns, F (4, 393) = 5.38, $p < .01$. However, the F values were not significant for No Need, F (4, 393) = 1.72, $p > .05$; and Lack of Information, F (4, 393) = 1.46, $p > .05$ (see Table 4.22).

Table 4.22

The Results of the Univariate ANOVAs

	Constraints to AED implementation	*SS*	*df*	*MS*	*F*	*p*
Number of Members	Cost	17.89	4	4.47	7.51*	.00
	No Need	3.79	4	.95	1.72	.15
	Lack of Support	6.34	4	1.59	3.47*	.00
	Lack of Information	2.62	4	.66	1.46	.22
	Management Concerns	10.57	4	2.64	5.38*	.00

*$p < .01$

Post hoc Bonferroni procedures were used to examine the comparison represented by the groups. For Cost, the results showed that managers with fewer than 300 members in their facilities, or with 300 to 500 members in their facilities, had a statistically significant higher cost concern than those who worked with 501 to1,000 members in their facilities (see Table 4.23). For Lack of Support, those managers who had less than 300 members in their facilities had a statistically significant higher constraint of Lack of Support to implement AED than those with 501 to 1,000 members or 1,001 to 3,000 in their facilities (see Table 4.24). For Management Concerns with statistical significance between groups, those managers who had less than 300 members in their facilities highly considered Management Concerns in AED implementation in their facilities as a perceived constraint than those with 300 to 500 members or 501 to 1,000 in their facilities (see Table 4.25).

Table 4.23

Bonferroni Post Hoc Test Results Regarding Cost and Number of Members in Facility

Variable		Observed Mean Difference	*p*	*F* (Bonferroni)
Less than 300	300-500	.19	.41	
	501-1,000	.65*	.00	
	1,001-3,000	.23	1.00	
	Over 3,000	-.21	1.00	
300-500	Less than 300	-.19	.41	
	501-1,000	.46*	.00	
	1,001-3,000	.037	1.00	
	Over 3,000	-.40	1.00	7.51*
501-1,000	Less than 300	-.65*	.00	
	300-500	-.46*	.00	(Less than 300,
	1,001-3,000	-.43	.07	300-500
	Over 3,000	-.86	.10	>
1,001-3,000	Less than 300	-.23	1.00	501-1,000)
	300-500	-.04	1.00	
	501-1,000	.43	.07	
	Over 3,000	-.43	1.00	
Over 3,000	Less than 300	.21	1.00	
	300-500	.40	1.00	
	501-1,000	.86	.10	
	1,001-3,000	.43	1.00	

*$p < .05$, Bonferroni results appear in parentheses under *F* value.

Table 4.24

Bonferroni Post Hoc Test Results Regarding Lack of Support and Number of Members in Facility

Variable		Observed Mean Difference	*p*	*F* (Bonferroni)
Less than 300	300-500	.17	.41	
	501-1,000	.31*	.04	
	1,001-3,000	.36*	.04	
	Over 3,000	.41	1.00	
300-500	Less than 300	-.17	.41	
	501-1,000	.14	1.00	
	1,001-3,000	.20	.99	
	Over 3,000	.24	1.00	3.47*
501-1,000	Less than 300	-.31*	.04	
	300-500	-.14	1.00	(Less than 300
	1,001-3,000	.05	1.00	>
	Over 3,000	.10	1.00	501-1,000,
1,001-3,000	Less than 300	-.36*	.04	1,001-3,000)
	300-500	-.20	.99	
	501-1,000	-.05	1.00	
	Over 3,000	.05	1.00	
Over 3,000	Less than 300	-.41	1.00	
	300-500	-.24	1.00	
	501-1,000	-.10	1.00	
	1,001-3,000	-.05	1.00	

*$p < .05$, Bonferroni results appear in parentheses under *F* value.

Table 4.25

Bonferroni Post Hoc Test Results Regarding Management Concerns and Number of Members in Facility

Variable		Observed Mean Difference	*p*	*F* (Bonferroni)
Less than 300	300-500	.25*	.03	
	501-1,000	.48*	.00	
	1,001-3,000	.33	.11	
	Over 3,000	.29	1.00	
300-500	Less than 300	-.25*	.03	
	501-1,000	.23	.28	
	1,001-3,000	.08	1.00	
	Over 3,000	.04	1.00	5.38*
501-1,000	Less than 300	-.48*	.00	
	300-500	-.23	.28	(Less than 300
	1,001-3,000	-.16	1.00	>
	Over 3,000	-.19	1.00	300-500,
1,001-3,000	Less than 300	-.33	.11	501-1,000)
	300-500	-.08	1.00	
	501-1,000	.16	1.00	
	Over 3,000	-.04	1.00	
Over 3,000	Less than 300	-.29	1.00	
	300-500	-.04	1.00	
	501-1,000	.19	1.00	
	1,001-3,000	.04	1.00	

*$p < .05$, Bonferroni results appear in parentheses under *F* value.

Manager's Knowledge Regarding AED Legislation and Perceived Constraints

A one-way MANOVA was conducted to examine the effect of the independent variable of a manager's legal knowledge associated with AEDs on five dependent variables: constraints to AED implementation. Table 4.26 presents the overall means and standard deviations for the five constraints by a manager's knowledge associated with AEDs.

Table 4.26

Means and Standard Deviations for Knowledge Regarding AED Legislation and Constraints to AED Implementation

	Manager's Knowledge Regarding AED Legislation							
	Specific Provisions (n = 7)		Basic concept (n = 48)		Law existence (n = 149)		No knowledge (n = 194)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Cost	3.29	1.11	3.54	.68	3.62	.77	4.02	.77
No Need	2.46	.75	2.83	.63	2.80	.78	3.02	.73
Lack of Support	3.07	.69	3.67	.69	3.55	.69	3.86	.64
Lack of Information	2.91	.97	3.77	.66	3.80	.72	4.17	.53
Management Concerns	2.52	.49	3.55	.68	3.57	.70	3.91	.67

Exploratory data analyses examined the assumptions for MANOVA. Box's M test was significant, indicating a violation of the assumption of homogeneity of variance-covariance matrices.

The multivariate analysis of variance result using the Wilks' Lambda was significant, Wilks Lambda = .821, F (15, 1077) = 5.32, $p < .01$, and indicated differences

among groups in constraints to AED implementation. The univariate *F* tests examined a significant difference among groups for Cost, F (3, 394) = 11.02, $p < .01$; for Lack of Support, F (3, 394) = 8.29, $p < .01$; for Lack of Information, F (3, 394) = 18.72, $p < .01$; and for Management Concerns, F (3, 394) = 16.32, $p < .01$. However, the *F* value was not statistically significant for No Need, F (3, 394) = 1.92, $p > .01$(see Table 4.27).

Table 4.27

The Results of the Univariate ANOVAs

	Constraints to AED implementation	*SS*	*df*	*MS*	*F*	*p*
Number of Members	Cost	19.50	3	6.50	11.02*	.00
	No Need	5.77	3	1.92	3.54	.02
	Lack of Support	11.04	3	3.68	8.29*	.00
	Lack of Information	22.41	3	7.47	18.72*	.00
	Management Concerns	22.50	3	7.50	16.32*	.00

*$p < .01$

Post hoc Bonferroni procedures for Cost, Lack of Support, and Management Concerns were used to examine the comparison represented by the groups. Post hoc Dunnett T3 procedures for Lack of Information were used to examine the comparison represented by the groups because Levene's test of equality of error variances values for Lack of Information was less than .05.

For Cost, the results showed that managers without knowledge of laws associated with AEDs had a statistically significant higher cost concern than those who understood the basic concepts of the AED law and those who were aware of the existence of AED laws (see Table 4.28). For Lack of Support, the managers who had no knowledge of AED

laws had a higher concern about lack of support for AED implementation than those managers who were aware of the existence of AED laws (see Table 4.29). For Lack of Information, the managers who had no knowledge of AED laws had more concerns about lack of information for AED implementation than those managers who understood the basic concept of AED laws and those who were aware of the existence of AED laws (see Table 4.30). For Management Concerns, the managers who had knowledge of specific provisions of AED legislation had less concern related to AED management than all other groups. Also, managers who had no knowledge of AED laws had more management concerns than all other groups, including managers who understood the basic concepts, those who knew the existence of AED laws, and those managers who had knowledge of specific provisions (see Table 4.31).

Table 4.28

Bonferroni Post Hoc Test Results Regarding Cost and Knowledge

	Variable	Observed Mean Difference	*p*	*F* (Bonferroni)
Specific provisions	Basic concept	-.26	1.00	
	Law existence	-.34	1.00	
	No knowledge	-.74	.08	
Basic concept	Specific provisions	.26	1.00	
	Law existence	-.08	1.00	11.02*
	No knowledge	-.48*	.00	(No knowledge
Law existence	Specific provisions	.34	1.00	>
	Basic concept	.08	1.00	Basic concept,
	No knowledge	-.40*	.00	Law existence)
No knowledge	Specific provisions	.74	.08	
	Basic concept	.48*	.00	
	Law existence	.40*	.00	

*$p < .01$, Bonferroni results appear in parentheses under *F* value.

Table 4.29

Bonferroni Post Hoc Test Results Regarding Lack of Support and Knowledge

	Variable	Observed Mean Difference	*p*	*F* (Bonferroni)
Specific provisions	Basic concept	-.58	.18	
	Law existence	-.48	.37	
	No knowledge	-.79	.01	
Basic concept	Specific provisions	.58	.18	
	Law existence	.10	1.00	8.29*
	No knowledge	-.20	.35	(No knowledge
Law existence	Specific provisions	.48	.37	>
	Basic concept	-.10	1.00	Law existence)
	No knowledge	-.31*	.00	
No knowledge	Specific provisions	.79	.01	
	Basic concept	.20	.35	
	Law existence	.31*	.00	

*$p < .01$, Bonferroni results appear in parentheses under *F* value.

Table 4.30

Dunnett T3 Post Hoc Test results Regarding Lack of Information and Knowledge

	Variable	Observed Mean Difference	*p*	*F* (Dunnett T3)
Specific provisions	Basic concept	-.85	.26	
	Law existence	-.88	.23	
	No knowledge	-1.26	.07	
Basic concept	Specific provisions	.85	.26	
	Law existence	-.03	1.00	18.72*
	No knowledge	-.41*	.00	(No knowledge
Law existence	Specific provisions	.88	.23	>
	Basic concept	.03	1.00	Basic concept,
	No knowledge	-.38*	.00	Law existence)
No knowledge	Specific provisions	1.26	.07	
	Basic concept	.41*	.00	
	Law existence	.38*	.00	

*$p < .01$, Dunnett T3 results appear in parentheses under *F* value.

Table 4.31

Bonferroni Post Hoc Test Results Regarding Management Concerns and Knowledge

	Variable	Observed Mean Difference	*p*	*F* (Bonferroni)
Specific provisions	Basic concept	-1.03*	.00	16.32*
	Law existence	-1.05*	.00	(No knowledge
	No knowledge	-1.40*	.00	>
Basic concept	Specific provisions	1.03*	.00	Basic concept,
	Law existence	-.02	1.00	Law existence)
	No knowledge	-.37*	.00	Specific provision)
Law existence	Specific provisions	1.05*	.00	
	Basic concept	.02	1.00	(Specific provisions
	No knowledge	-.35*	.00	<
No knowledge	Specific provisions	1.40*	.00	No knowledge,
	Basic concept	.37*	.00	Basic concept,
	Law existence	.35*	.00	Law existence)

*$p < .01$, Bonferroni results appear in parentheses under *F* value.

Gender and Perceived Constraints

The independent samples *t*-test was computed to examine the difference between gender and perceived constraints (Cost, No Need, Lack of Support, Lack of Information, and Management Concerns). As shown Table 4.32, the mean for Cost (male) was 3.79 (*SD* = .792), and the mean for Cost (female) was 3.84 (*SD* = .849). The mean for No Need for male was 2.93 (*SD* = .712), and the mean for No Need for female was 2.65 (*SD* = .994). The mean for Lack of Support for male was 3.72 (*SD* = .669), and the mean for Lack of Support for female was 3.57 (*SD* = .821). The mean for Lack of Information for male was 3.97 (*SD* = .675), and the mean for Lack of Information for female was 3.88 (*SD* = .654). The mean for Management Concerns for male was 3.73 (*SD* = .695), and the mean for Management Concerns for female was 3.61 (*SD* = .904). No statistical significant differences were found between gender and perceived constraints of AED implementation (Cost, No Need, Lack of Support, Lack of Information, and Management

Concerns) at the .05 level: for Cost (t = -.361, df = 396, p > .05); for No Need (t = 1.611, df = 38.653, p > .05); for Lack of Support (t = 1.204, df = 396, p > .05); for Lack of Information (t = .767, df = 396, p > .05); and for Management Concerns (t = .738, df = 39.227, p > .05).

Table 4.32

Independent Samples T-Test Summary by Gender and Perceived Constraints

Perceived constraint	Gender	*n*	*M*	*SD*	Std error mean
Cost	Male	362	3.80	.79	.04
	Female	36	3.85	.85	.14
No Need	Male	362	2.93	.71	.04
	Female	36	2.66	.99	.17
Lack of Support	Male	362	3.72	.67	.04
	Female	36	3.58	.82	.14
Lack of Information	Male	362	3.97	.67	.04
	Female	36	3.88	.65	.11
Management Concerns	Male	362	3.73	.70	.04
	Female	36	3.61	.90	.15

Table 4.33

Levene's Test for Equality of Variances

	Levene's test for equality of variances			*t*-test for Equality of Means		
		F	*p*	*t*	*df*	*Sig*(2-tailed)
Cost	Equal variance assumed	1.26	.26	-.36	396	.72
	Equal variance not assumed			-.34	41.28	.74
No Need	Equal variance assumed	3.67	.00	2.11	396	.04
	Equal variance not assumed			1.61	38.65	.12
Lack of Support	Equal variance assumed	3.67	.06	1.20	396	.23
	Equal variance not assumed			1.02	39.76	.32
Lack of Information	Equal variance assumed	.03	.86	.77	396	.44
	Equal variance not assumed			.79	42.73	.44
Management Concerns	Equal variance assumed	6.59	.01	.91	396	.36
	Equal variance not assumed			.74	39.23	.47

CHAPTER 5

DISCUSSION

Many risk management studies have been conducted. However, no prior study that examined the implementation of automated external defibrillators (AEDs) in health/fitness facilities and related risk management practices has occurred in South Korea. This study explored and described: (1) the status of AED implementation in South Korean health/fitness facilities, (2) risk management practices associated with AED implementation, and (3) constraints to AED implementation. The literature review provided the fundamental elements to develop this study through an analysis of American legislation and court decisions. South Korean laws and incidents were used to understand the relationship between sudden cardiac arrest (SCA) and the importance of risk management practices associated with the use of AEDs. A sample of 436 health/fitness facility managers in South Korea completed the survey, representing a response rate of 71%. Research questions were formulated and the data were analyzed using frequency, Chi-Square, and multivariate analysis of variance (MANOVA). The study identified five primary constraints to AED implementation in South Korean health/fitness facilities.

This chapter discusses the results of the analyses in light of each research question, practical implications of the study, limitations of the study, recommendations for future research, and conclusions.

Research Questions

Research Question 1: What is the status of AED implementation in South Korean health/fitness facilities?

In terms of the status of AED implementation, the findings of this study

suggested that AED implementation in health/fitness facilities in South Korea was low. At the time of this study, 91.3% of the respondents (n = 398) indicated that their health/fitness facilities did not have an AED. The study found an uneven distribution of AEDs by location. Five of the 10 regions did not have a facility with an AED. Thirty-seven of the 38 facilities, that had AEDs, were located in densely populated metropolitan regions, including Seoul, Gyeonggi, Gyeongsangnam, and Gyeongsanbuk provinces.

Of the 38 facilities that implemented an AED program, 14 were privately owned, nine were non-profit, nine were owned by local governments, four were owned by hotel/accommodation, one was an international fitness chain, and one was owned by a domestic fitness chain. Local governments (9 out of 24) and non-profits (9 out of 28) dominated the other types of facilities.

The status of AED implementation differed based on the facility membership. More than 60% of the managers who had implemented AED programs worked at facilities with 501 to 1,000 members. This was contrary to the expectation that greater emphasis would be given to the potential for sudden cardiac arrest among facilities with large memberships. Only seven managers who worked at facilities with more than 3,000 members reported having AEDs in their facilities.

Interestingly, all 38 facility managers who had one or more AEDs in their facilities were aware of the laws regarding AEDs. As expected, the managers who reported no knowledge of AED immunity laws also failed to have AEDs in their facilities. Of the 38 managers, a majority of them knew the basic concepts of laws related to AEDs. However, only six managers reported that they understood the laws' specific provisions. Kim et al. (2010) noted that less than 20% of responders in their study were aware of the

existence of the laws related to AEDs including the Good Samaritan law. The results of this study were consistent with Kim et al.'s findings.

This study also indicated that a majority of the 38 managers who had one or more AEDs in their facilities also had one or more staff members certified in cardiopulmonary resuscitation (CPR) or AED certification. However, eight of the 38 (21.1%) managers had implemented an AED program without employees' certification in CPR or AED. With regard to CPR or AED education, the South Korean law stated:

> Article 14 of Emergency Medical Service Act
>
> (1) The Minister for Health, Welfare and Family Affairs or the Mayor/Do Governor may order a person falling under any of the following subparagraphs to receive education on rescue and first-aid treatment: <Amended by Act No. 6677, Mar. 25, 2002; Act No. 8692, Dec. 14, 2007; Act No. 8852, Feb. 29, 2008>
>
> 6. Persons engaged in affairs on medical service, relief or safety in sports facilities under Article 5 and 10 of the Installation and Utilization of Sport Facilities Act.

When asked "Would you be interested in learning more about AEDs?" of the 436 managers, most were interested in specifically learning more about the effectiveness of AEDs. Their second highest interest was associated with liability in using AEDs. However, more than 50% of the managers who responded to the survey had no interest in learning more about AEDs in general. A common thread appears in the results of Kim's (2009) study and this study, that is, the overall lack of seriousness of sudden cardiac arrest (SCA) in South Korean society, and the need for more AEDs. When Korean health/fitness managers better understand the gravity of SCA and the effectiveness of AEDs in health/fitness facilities, they will likely pay more attention to the implementation of AED programs.

Research Question 2: For health/fitness facilities with AEDs, what risk management practices are associated with AED implementation?

Of the 436 surveys returned, 38 managers (8.7%) responded that their facilities had one or more AEDs. When managers were asked how long the AED had been in place, most of the responders (90%) reported their AED implementation period as "less than 3 years." The result implied that most AED implementation in South Korean health/fitness facilities were in operation since the Emergency Medical Service Act was revised in 2008.

With regard to cardiac arrest preparation and trained staff at facilities, the Installation and Utilization of Sport Facilities Act stated:

> Article 24 Standards for Safety and Sanitation of the Installation and Utilization of Sport Facilities Act <Amended by Act No. 8852, Feb. 29, 2008>
>
> (1) A sport facility owner has a duty to follow the order of the Minister for Health, Welfare and Family Affairs regarding provision of safety staffs, management of water quality, and protective equipment.

However, the results showed that even though 38 managers reported having one or more AEDs in their facilities, 34% of the managers responded that no staff member was trained in the use of AEDs. And even more disturbing, 17 facilities had only one trained staff member who was on duty during the facility's operating hours. Based on these results, only 17 of the 436 health/fitness facilities could deliver early defibrillation with an AED by a trained staff member in an emergency situation. This result was consistent with the study of Kim and Kang (2011) that found fewer than 5% of SCA victims were treated with defibrillation before arriving at a hospital. The rest of the South Korean facilities could face difficulty in providing early defibrillation to SCA victims, or must rely on local emergency medical service (EMS) or other medical staff for AED-

assistance. Future provisions of the AED laws or health/fitness industry standards/guidelines should be developed for Korean health/fitness facilities. Twelve of the 38 managers responded that they had staff training associated with AED use every month. But no AED staff training existed in six of the health/fitness facilities.

Responses to the existence and practice of a written Emergency Action Plan (EAP) showed that 82% (31 of 38) of managers had a written EAP and practiced the EAP periodically. But seven managers did not have a written EAP. According to Drezner, Rao, Heistand, Bloomingdale, and Hardon (2009), those working without an EAP, may reduce the effect of early defibrillation.

To secure a SCA-related survival rate over 50%, the ACSM (2011) suggested that defibrillation should be delivered within 5 minutes. This study found that 22 of the 436 participants reported one or more AEDs in their facility, and that the local EMS could arrive at their facility within 5 minutes. In addition, 16 of the 436 participants reported one or more AEDs in their facilities, and a SCA victim in the facility could be transported to the nearest hospital within 5 minutes. Even though every health/fitness facilities cannot be located near a hospital, a recommendation is that AEDs and AED drills should be in place in every health/fitness facility.

Research Question 3: For facilities without AEDs, what constraints influence AED implementation?

One of the primary purposes of this study was to identify the constraints why managers did not implement AEDs in their health/fitness facilities. To investigate a perceived constraint to AED implementation in a health/fitness facility, five constraint variables were derived from Connaughton et al.'s (2007) study. The revised 26 items for

this South Korean study were divided into five constraint variables by exploratory factor analysis: (1) Cost, (2) No Need, (3) Lack of Support, (4) Lack of Information, and (5) Management Concerns.

To measure internal consistency of the five constraint variables, Cronbach alpha values were examined. The results showed that all five variables had a statistically acceptable level of reliability; Cost ($\alpha = .93$), No Need ($\alpha = .84$), Lack of Support ($\alpha = .79$), Lack of Information ($\alpha = .92$), and Management Concerns ($\alpha = .90$).

Questions about the greatest perceived constraints to AED implementation in a health/fitness facility, by employing a 5-point Likert scale ranging from 1 (*no constraint*) to 5 (*very constraint*), revealed the five highest perceived constraints: (1) Lack of Information associated with required certification and training to AED implementation (Question 16); (2) Lack of an AED instructor (Question 26); (3) Lack of Information regarding supervisory responsibility (Question 15); (4) Lack of Information associated with protection from liability with AED implementation (Question 14); and (5) Additional staff certification and training (Question 24). By comparing the results of this study with the study conducted by the International Health, Racquet, and Sportsclub Association (IHRSA, 2002), liability with AED implementation and staff training were perceived as significant constraints. The results from this study were different than those found in Connaughton et al.'s (2007) study which found the overall four highest constraints to AED implementation in Florida health/fitness facilities were costs associated with an AED device, in-service training, AED certification, and maintenance of an AED. The next highest constraint in Connaughton et al.'s (2007) study was lack of information.

This study also found that the five least constraints to AED implementation in health/fitness facilities were: (1) Protection offered by waiver (Question 9); (2) Pre-activity screening (Question 7); (3) CPR alone is adequate (Question 8); (4) Proximity of local EMS (Question 5); and (5) Low probability of cardiac arrest for members (Question 6). The results were different than Connaughton et al.'s (2007) study that found managers' overall least constraints to AED implementation in Florida health/fitness facilities were lack of support from professional association, legal counsel, and owner/upper administration. In addition, protection by waiver and staff reluctance were perceived as the next least constraints in Connaughton et al.'s (2007) study.

One-way multivariate analysis of variance tests were conducted to examine the effect of the various variables on constraints to AED implementation. The results showed differences in the constraints to AED implementation by facility location. For example, the managers in Gyeongsanbuk Province felt more pressure regarding the cost issues of AED implementation than the managers in Gyeonggi or Jeju provinces. Also, managers in Jeollanam Province perceived more burdens regarding cost concerns of AEDs than managers in Jeju Province. Differences in the Lack of Support variable existed between Chungcheongnam and Gyeonggi provinces. Lack of support for AED implementation in health/fitness facilities may impose more constraints on managers who work in Chungcheongnam Province than those who work in Gyeonggi Province. Future studies on differences of support for AED implementation in health/fitness facilities by local governments may be meaningful to understanding the findings of this study.

The results also revealed that ownership of a facility influenced the constraints for AED implementation. Managers who worked in privately owned facilities perceived

more cost concerns to AED implementation than those who worked in facilities owned by non-profit organizations. Owners of private facilities focused on the price-benefit (price versus benefit) of AEDs, while non-profit organizations concentrated more on the benefits of AEDs rather than on the cost for AED implementation, certification, and training staffs.

Differences in the constraints to AED implementation by managers of the facility were revealed through the multivariate analysis of variance (MANOVA). Statistically significant differences in Cost, Lack of Support, and Management Concerns were identified. Managers who worked in small health/fitness facilities, with less than 300 members or 300 to 500 members, experienced an increase in the perceived constraint related to cost for AED implementation than those who worked in facilities with 501 to 1,000 members. Managers with less than 300 facility members perceived less support overall involving AED implementation than did managers with larger facility membership (501-1,000 or 1,000-3,000). Managers with less than 300 members had more AED management concerns as constraints to the implementation of AED programs than those who had 300-500 or 501-1,000 members.

A manager's knowledge of AED laws had an influence on the respondent's view of constraints to AED implementation in their facilities. The level of a manager's knowledge of AED legislation had an effect on Cost, Lack of Support, Lack of Information, and Management Concerns of AED implementation. For cost and lack of information, managers without knowledge of AED laws perceived cost and lack of information as greater constraints to AED implementation than managers who understood the basic concepts of AED legislation. If a manager, who had no knowledge of AED

legislation, was aware of AED laws and methods to protect their facilities from a sudden cardiac victim's lawsuit, the concerns about cost and information of AED implementation might be decreased.

The findings of Management Concerns suggested that managers with no knowledge of AED laws perceived greater constraints to AED implementation than managers who had some level of knowledge of AED laws. On the other hand, the managers who knew specific provisions regarding AED laws had less constraint regarding management concerns than managers who had no knowledge of AED laws, or those who understood basic concepts of AED laws. The results also revealed that managers who had no knowledge of AED laws perceived greater constraints regarding lack of support from insurance companies, legal counsel, and owners than those managers who knew about the existence of AED laws.

An independent sample t-test was used to compare differences by gender of the manager. Gender of the manager had no influence on the constraints to AED implementation in a health/fitness facility.

In summary, the findings of the three research questions showed that the status of AED implementation in South Korean health/fitness facilities was only 8.7 %. Distribution of AEDs by location and ownership was uneven. The level of manager’s knowledge of AED laws was also low. In addition, more than 50% of the managers had no interest in learning more about AEDs. The fact that South Korea does not mandate the placement of AEDs in health/fitness facilities might be a reason for the low implementation, along with the low level of manager’s knowledge of AED laws, and little interest in AED implementation.

Regarding AED risk management practices, about 65% of the managers responded that there was one or more staff members trained in using AEDs present during all business hours. However, less than 5% (17 of 436) health/fitness facilities could provide early defibrillation with an AED by an on-duty trained staff member in an emergency situation. Emergency Action Plans existed in approximately 80% of the facilities. Local EMS were able arrive at 5% of the health/fitness facilities with AEDs within 5 minutes. Only 4% of the facilities with AEDs could transport a SCA victim to the nearest hospital within 5 minutes.

The study elicited the following five manager's constraints for AED implementation: (1) Lack of Information associated with required certification and training to AED implementation; (2) Lack of an AED instructor; (3) Lack of Information regarding supervisory responsibility; (4) Lack of Information associated with protection from liability for AED implementation; and (5) Additional staff certification and training. The study also found that the five lowest constraints to AED implementation in health/fitness facilities were: (1) Protection offered by waiver; (2) Pre-activity screening; (3) CPR alone is adequate; (4) Proximity of local EMS; and (5) Low probability of cardiac arrest for members.

Implications of the Study

The demographics of South Korea show that the country is rapidly heading into an "Aging Society" (Kim & Kang, 2011). Based on 2011 South Korean statistics, people over the age of 65 numbered 5,537,000, or 11.3% of the South Korean population (KOSIS, 2011). So it appears that the South Korean population should be considered as a high risk for sudden cardiac arrest (SCA) and that health officials should pay attention to

preventing deaths from SCA.

The healthcare industry, which includes medical programs and equipment, health/fitness facilities, and various recreational sports programs in South Korea, is growing fast. A health/fitness facility is an important component of the healthcare industry (Won, 2011). Health/fitness facilities, however, are considered as likely public places where sudden cardiac arrest occurs (Becker, Eisenberg, Fahrenbruch, and Cobb, 1998). However, the probability of SCA in a health/fitness facility was not recognized by many South Korean health/fitness facility managers.

The results of the study revealed that AED implementation in South Korean health/fitness facilities is low. Moreover, the slow implementation of AED programs in South Korea may result from insensitivity toward public safety.

This study suggests that attention be paid to the following:

1. The results showed a low level of AED implementation in health/fitness facilities in South Korea, resulting from Lack of Information about required certification and training, protection from liability, supervisory responsibility, and Management Concerns of AED instructors with reference to staff certification and training. Thus, the South Korean government and health/fitness industry officials should consider these constraints in future planning.
2. Education programs should be created for health/fitness managers in South Korea to inform them about AED laws, Emergency Action Planning, avoidance of liability, certification and training, and other issues regarding AEDs. For the managers who were aware of the existence of the basic concepts of AED laws, additional follow-up education is recommended. Oh (2006) found that the Seoul

government attracted voluntary participation from health/fitness establishments for education programs involving CPR/AED. However, the participation rates were very low. Mandatory participation for future education programs for managers or staff members should be considered.

3. Professional guidelines/standards similar to the ACSM (2011, p. 24) for AED implementation and for risk management planning including Emergency Action Planning should be considered. Note that according to the ACSM at least one CPR/AED trained staff member should be in a facility during all operating hours.
4. Policies to encourage the South Korean public to recognize AEDs should be developed. For example, the Japanese government provides automatic AED vending machines to promote AED deployment (Kim, 2009). AED implementation needs to be considered essential in health/fitness facilities, and on a par with mandatory fire extinguishers on such premises.
5. The South Korean government should encourage South Korean health/fitness facilities to have AEDs, Emergency Action Plans, certification and staff training, and other essential safety measures.

Limitations of the Study

The results of this study should be analyzed and interpreted with care, even though the study attempted to represent the characteristics of the entire South Korean health/fitness facilities. This study has several limitations, including but not limited to:

1. The population and samples were concentrated on Seoul, Gyeonggi, and Gyeongsangnam provinces, and privately owned facilities. Even though some international health/fitness chains are growing in South Korea, under-represented

groups were not selected. The results could be affected by this issue.

2. Some concerns may be associated with responders' truthfulness to the questions. Responders could have changed their answers to meet the ideal social standards rather than reporting their present situation. For example, answers to the existence of an Emergency Action Plan, training staff, or on-duty staff in facilities could be biased, which may have threatened the internal validity of this study.

Recommendations for Future Research

The results of this study point to several promising applications for future research. First, it was difficult to find and analyze the results of Korean lawsuits associated with AEDs in health/fitness facilities. The investigation of future AED law in South Korea through the results of South Korean lawsuits could be meaningful. A follow-up study to investigate the status of AED implementation in South Korean health/fitness facilities could also be meaningful.

Second, for the purpose of comparison, it could be useful to replicate this study, using similar or revised methods among other sports venues, such as golf courses, aquatic centers, sports arenas, and other organized sport venues.

Third, from a sport management perspective, future studies could analyze how risk management practices in health/fitness facilities, including Emergency Action Plans, AED implementation, and other safety measures, affect facility members' satisfaction, facility brand image, or renewal of memberships. Also, the investigation of risk management practices from health/fitness industry franchise leaders could be significant.

Conclusions

Even though this study did not encompass a full understanding of the constraints to AED implementation, it may assist in building the body of knowledge on AED implementation in South Korean sport venues in general, and health/fitness facilities specifically. The overall results from this study suggest that health/fitness facility managers do not seem to recognize the need for AEDs.

Optimistically, the study can contribute to an increase in overall AED implementation in South Korean health/fitness facilities via facility managers' increased awareness to AED implementation and the potential SCA problem. In the future, enactment of additional AED regulatory laws in sport venues will also influence AED implementation in South Korean sport facilities.

APPENDIX A

EVOLUTION OF AED PROGRAMS IN THE UNITED STATES

AED Legislation by States

Period	Characteristics
1997	Florida was the first state to enact a broad public access law in April 1997 (Fla.Stat. 401.2915).
2001	All 50 states had passed defibrillator laws or adopted regulations.
2003	Utah (UT Code §26-1-7) updated its AED law by providing a statewide registry. Virginia updated AED laws by deleting the requirement for registration. Alabama, Alaska, Colorado, Connecticut, Indiana, Kansas, Nebraska, Nevada, Tennessee, and Texas also changed or expanded their AED laws.
2004	AED laws were changed or expanded in Connecticut, Florida, Hawaii, Idaho, Illinois, Louisiana, Maine, Michigan, Missouri, New York, Ohio, Oklahoma, and Rhode Island. The Illinois law (H.4232) required that every physical fitness facility have at least one AED on its property by mid-July 2006, with some exceptions.
2005-2006	Maryland added a requirement that every high school and school-sponsored athletic event have an AED on the premises. Each of California's health clubs were required to have at least one AED. Florida approved state and local police vehicles to carry AEDs. Indiana and Virginia repealed filling and training requirements. New York required places of public assembly to keep an AED. Oregon updated Good Samaritan protection for trained AED providers, employers, property owners and sponsoring agencies. Arizona, Colorado, Florida, Illinois, Maryland, Massachusetts, Nebraska, New Jersey, Pennsylvania, and Wisconsin also passed AED laws.
2007	Texas stopped over-the-counter sales of AEDs.
2008	Laws were enacted in Georgia, Idaho, Illinois, Indiana, Iowa, Massachusetts, New Hampshire, New York, South Carolina, Tennessee, West Virginia, Wisconsin, and the District of Columbia.
2009	Illinois (HB 921) added AEDs to dentist offices. Kansas and North Carolina expanded access to AEDs by allowing "any person to use an AED."
2010	Arizona, Idaho, Maryland, Missouri, and Oregon enacted laws to assure that program facilitators, individuals, and businesses and entities that placed AEDs in their establishments were provided immunity. Maryland and Missouri's new laws also guarantee protections to lay rescuers who in "good faith" used an

	AED to save someone from sudden cardiac arrest. Iowa and Wisconsin required all high schools students to be offered lifesaving CPR training. This training must include skill development in hands-on coursework. Arkansas secured $300,000 to fund a Medical Emergency Response Plan for schools to assure that AEDs were placed correctly and that school staff members were trained properly.
2011-2012	As of January 2012 there were a total of fifty six state bills pending or recently passed which specifically relate to Defibrillator (AEDs) and Cardiac Arrest. States with pending or newly passed legislation include CA (1), FL (4), GA (2), HI (2), IL (1), KY (1), MA (4), ME (1), MI (3), MN (2), NC (1), NJ (5), NY (18), OK (1), PA (1), RI (3), TN (2), VA (3), and VT (1).

Source: National Center of State Legislatures (2012)

Evolution of the AED Program in the United States

Period	Characteristics
1986	The American Heart Association (AHA) and *Journal of the American Medical Association* (JAMA) identified "health club personnel" as capable first responders and recommended users of AEDs.
1988	The efficacy of AEDs was recognized in the medical community.
1994	The media began publicizing of use and importance of widespread placement of AEDs.
1992	The AHA and American Red Cross (ARC) widely publicized information that suggested the chance of an SCA victim being revived successfully had decreased 7% to 10% for every minute defibrillation was delayed.
1994	The AHA published standards, which included AED use as part of Basic Life Support, and stated that any person who was expected to respond to a victim of SCA was trained in the use of and equipped with an AED.
1996	The domestic airline industry began to announce publicly its goal to install AEDs on all passenger aircraft.
1997	The YMCA drafted internal recommendations for deployment of AEDs in its fitness centers. The YMCA began using AEDs and saving lives.

1999	Many health clubs publicly recognized that traditional responses were ineffective in resuscitating SCA victims and ineffective in preventing neurological damage unless employing immediate access to AEDs.
1999	The results of the International Health Racquet and Sportsclub Association (IHRSA) vote showed that more than 40% of the clubs had AEDs in place or planned to obtain them.
2000	All 50 states passed Good Samaritan laws providing immunity for lay rescuers using AEDs. The purpose of these laws was to encourage widespread use of AEDs by first responders by removing fear of liability.
2000	President Clinton signed into law the Cardiac Arrest Survival Act. This law requires all federal buildings to have AEDs(42 U.S.C. § 238).
2001	The American Red Cross stated that instruction in the use of AEDs was an "integral" unit of first aid training, much like CPR.
2002	The American College of Sports Medicine (ACSM) and the ADA issued a joint recommendation about AED placement in health clubs. The two groups strongly recommended that AEDs be placed in any club that had 2,500 members, was more than five minutes from an EMS, or catered to older or deconditioned members.
2004	The Food and Drug Administration (FDA) granted marketing clearance for over-the-counter sales of AEDs for home use because the device could be safely and effectively used by laypeople with minimal training.
2011-2012	They relate to a variety of subjects: training in the workplace, schools, and medical facilities, availability of Defibrillators (AEDs) in gyms, place of work, schools, government buildings, community centers, golf courses, public areas, and medical facilities, a declaration of Cardiac Awareness Month, emergency actions plans of school districts to include Defibrillators (AEDs) in their emergency plan equipment, immunity from civil liability for the use of Defibrillator (AEDs) in good faith during an emergency, and tax credits for the cost of purchasing Defibrillators (AEDs).

Source: ACSM (2011), NCED (2011a; 2011b; 2011c); NCSL (2012)

APPENDIX B

IRB APPROVAL FOR THE SURVEY QUESTIONNAIRES

THE UNIVERSITY of
NEW MEXICO
Main Campus Institutional Review Board
Human Research Protections Office
MSC08 4560
1 University of New Mexico~Albuquerque, NM 87131-0001
http://hsc.unm.edu/som/research/HRRC/

17-Apr-2012

Responsible Faculty: Annie Clement
Investigator: Chanmin Park
Dept/College: Health Exercise & Sports Science

SUBJECT: IRB Determination of Exempt Status
Protocol #: 12-152
Project Title: Status of the Implementation of Automated External Defibrillator in South Korean Health/Fitness Facilities
Approval Date: 17-Apr-2012

The Main Campus Institutional Review Board has reviewed the above-mentioned research protocol and determined that the research is ***exempt*** from the requirements of Department of Health and Human Services (DHHS) regulations for the protection of human subjects as defined in 45CFR46.101(b) under category 2, based on the following:

1. Study Application submitted 04-13-12.

2. Informed consent Cover Letter for Anonymous Surveys submitted 04-09-12, and Korean translation.

3. Study Survey, parts A, B, C and D.

4. Study Protocol version 03-30-12

Because it has been granted exemption, this research project is not subject to continuing review.

Changes to the Research: It is the responsibility of the Principal Investigator to inform the IRB of any changes to this research. A change in the research may disqualify this project from exempt status. Reference the protocol number and title in all documents related to this protocol.

Sincerely,

J. Scott Tonigan, PhD
Chair
Main Campus IRB

APPENDIX C

SURVEY QUESTIONNAIRES (ENGLISH VERSION)

University of New Mexico

Informed Consent Cover Letter for Anonymous Surveys

STUDY TITLE
STATUS OF THE IMPLEMENTATION OF AUTOMATED EXTERNAL DEFIBRILLATOR IN SOUTH KOREAN HEALTH/FITNESS FACILITIES

Chanmin Park from the Department of Health, Exercise, and Sports Science is conducting a research study. The purpose of the study is to investigate the use and non-use of Automated External Defibrillator (AEDs) in South Korean health/fitness facilities. An AED is a portable device that checks the heart rhythm. If needed, it can send an electric shock to the heart to try to restore a normal rhythm for a sudden cardiac arrest (SCA) victim. You are being asked to participate in this study because your position as a manager/director in your health/fitness facility.

Your participation will involve paper and pencil survey. The survey should take about 10-15 minutes to complete. Your involvement in the study is voluntary, and you may choose not to participate. There are no names or identifying information associated with this survey. The survey includes questions such as "Does your facility have at least one Automated External Defibrillator?" You can refuse to answer any of the questions at any time. There are no known risks in this study, but some individuals may experience discomfort when answering questions. All data will be kept for two years in a locked file in the primary investigator's office and then destroyed.

The findings from this research can bring about a greater understanding of the status of use of AEDs in South Korean health/fitness facilities. Such information could prove to be valuable to South Korea health/fitness industry during the development of the risk management practices. If published, results will be presented in summary form only, in scholarly, peer-reviewed journals.

If you have any questions about this research project, please feel free to call Chanmin Park at +1 (352) 727-0812 or by email at parkcm@unm.edu; or you may contact the advisor, Dr. Annie Clement, at +1 (505) 821-1127 or aclement@unm.edu. If you have questions regarding your legal rights as a research subject, you may call the UNM Human Research Protections Office at +1 (505) 272-1129.

By returning this survey in the envelope provided, you will be agreeing to participate in the above described research study.

Thank you for your consideration.

Sincerely,

Researcher's Name
Chanmin Park, M.S., M.Ed.

Researcher's Title
Doctoral Candidate

PART A: Background Information

1. **What is your official job title?**
   _____

2. **How many years have you worked in your current position? Number of Years**
   _____

3. **For each category listed below, approximately how many staff members are employed by your facility?**

   Full-time Paid Staff _____ Part-time Paid Staff _____ Volunteer Staff _____

4. **How many members currently belong to your program/club? (Check one)**

   Under 300 people _____ 300 - 500 people _____ 501 -1,000 people _____
   1,001- 3,000 people _____ Over 3,000 people _____

5. **What is your gender?** Male _____ Female _____

6. **List all professional certifications related to CPR and/or AED that you currently hold.**
   _____

7. **What province is your facility located in? (Check one)**

Seoul _____ Gyeonggi-do _____ Chungcheongbuk-do _____

Chungcheongnam-do _____ Gyeongsangbuk-do _____ Gyeongsangnam-do _____

Gangwon-do _____ Jeollabuk-do _____ Jeollanam-do _____ Jeju-do _____

8. **What type of ownership is your facility under? (Check one)**

Private Owned _____ Local Government owned _____
Hotel/ Accommodation _____ Non-profit organization _____
Korean Fitness chain _____ International Fitness _____

9. **Which of the following members' medical information do you currently require for membership? (Check all that apply)**

Over 50 years of age_____ High-blood pressure_____ High cholesterol_____

Sedentary life _____ History of heart disease_____ Family history of heart disease _____

10. **What percentages of your members are over the age of 40?** Approximately _____

Please continue with PART B (next page)

PART B: Automated External Defibrillator (AED) Knowledge and Use

1. **What is your level of familiarity with the Emergency Medical Service Act focusing on AED immunity laws? (Check one)**

I understand specific immunity provisions _____
I understand the basic concept of the law _____
I only know that a law exists that protects certain parties _____
I have no knowledge of Korean immunity laws _____

2. **Would you be interested in learning more about AEDs?**

No _____
Yes _____ If yes, what would you like to know more about? (Check all that apply)
Effectiveness _____ Purpose _____ Training _____ Costs _____
Liability associate with use _____ Manufacturer/Retailer information _____
Please list other AED information that you are interested in:
_____

3. **Does your facility have at least one AED?**

Yes _____ If yes, complete parts (C) and (D).
No _____ If no, skip part (C), complete part (D)

PART C: Your facility currently has an AED(s)

1. **How many AEDs does your facility have?** Number of AEDs _____

2. **How long has your facility had an AED(s)? (check one)**
   0-6 months _____ 7-12 months _____ 13-24 months _____
   25-36 months _____ longer than 3 years _____

3. **Do you have paid staff members in your facility that are currently trained to use an AED?**
   Yes _____ **No _____** **If yes,** number currently trained _____

4. **Is there a staff member who is currently AED trained that is on-duty during all hours that your facility is open for business?**
   Yes _____ No _____

5. **Has an AED at your facility ever been utilized in an emergency situation?**
   Yes _____ No _____

Please continue on next page

6. Do you conduct in-service training for AED users?

Yes _____ No _____

If yes, how often?

Beginning employment/volunteer service _____ Every month _____

Every 2 months _____ Every 3 months _____

Every 6 months _____ Every 12 months _____

Other _____

7. Do you have an Emergency Action Plan that addresses sudden cardiac arrests?

Yes _____ No _____

If yes, what is the status of employee training?

No- Training _____ Beginning Employment/Volunteer _____ Every Month _____

Every 2 Months____ Every 3 Months ____ Every 6 Months_____ Every 12 Months ____

8. How often are the AEDs in your health/fitness facility inspected by your province?

At time of incident _____ Every Month _____ Every 2 Months _____

Every 3 Months _____ Every 6 Months_____ Every 12 Months _____

9. Have you, or someone from your facility, consulted with local Emergency Medical Service (EMS) regarding your AED program?

Yes _____ No _____

10. Approximately, how long does it take the local EMS to get to your facility when an emergency situation occurs?

3 minutes _____ 5minutes _____ 7 minutes _____

10 minutes _____ 15 minutes_____ 20 minutes _____ Unsure _____

11. Approximately, how long does it take the local EMS to get from your facility to the nearest hospital emergency room?

3 minutes _____ 5minutes _____ 7 minutes _____

10 minutes _____ 15 minutes_____ 20 minutes _____ Unsure _____

Please continue with PART D (next page)

PART D: For all participants to complete

What do you feel are/were the constraints/barriers to having an AED at your facility? For each item, please check the response that best reflects your answer.

	No constraint	Slight constraint	Moderate constraint	Strong constraint	Very strong constraint
Costs:					
Cost of the AED…….	1	2	3	4	5
Cost of in-service training……..	1	2	3	4	5
Cost of certification……	1	2	3	4	5
Cost of maintenance ……..	1	2	3	4	5
AEDs not needed due to:					
Proximity of local EMS …….	1	2	3	4	5
Low probability of cardiac arrest for members/clients ……	1	2	3	4	5
Pre-activity screening procedures are sufficient ……...	1	2	3	4	5
CPR alone is adequate ……	1	2	3	4	5
Protection offered by waiver …..	1	2	3	4	5
Lack of support from:					
Insurance company …….	1	2	3	4	5
Risk Manager ……..	1	2	3	4	5
Local Counsel …….	1	2	3	4	5
Upper management or owner …..	1	2	3	4	5
Lack information about:					
Protection from liability ……..	1	2	3	4	5
Supervisory responsibilitie……	1	2	3	4	5
Required certification and training …	1	2	3	4	5
Purpose and function of AEDs … ..	1	2	3	4	5
Use and operation of AEDs ……	1	2	3	4	5
Management concerns:					
Staff reluctance ……..	1	2	3	4	5
Not a current standard practice ……	1	2	3	4	5
Fear of litigation ……..….	1	2	3	4	5
Time to implement and train staff in use	1	2	3	4	5
Difficulty in using an AED ……	1	2	3	4	5
Additional staff certification and training .	1	2	3	4	5
Additional supervisory responsibilities…..1		2	3	4	5
Lack of AED instructor availability …	1	2	3	4	5

APPENDIX D

SURVEY QUESTIONNAIRES (KOREAN VERSION)

PART A: 관련 배경 정보

1. 당신의 직책은? _____

2. 당신은 현재 직책에서 몇년동안 일하셨나요? _____ 년

3. 현재 당신의 휘트니스 센터에서 일하는 직원수는?

정식 직원_____명 파트타임 직원 _____명 자원봉사자 _____명

4. 현재 당신의 휘트니스 센터의 등록인원수는?

300명 미만 _____ 300-500명 _____ 501-1000명 _____

1001-3000명 _____ 3000명 초과 _____

5. 당신의 성별은 ? 남 _____ 여 _____

6. 당신이 응급소생술(CPR)과 자동제세동기(AED) 와 관련하여 가진 자격증을 모두 쓰시오.

_____

7. 당신의 휘트니스 센터가 있는 관할행정구역은?

서울시_____ 경기도 _____ 충청북도 _____ 충청남도 _____

경상북도 _____ 경상남도 _____ 전라북도 _____ 전라남도 _____

강원도 _____ 제주도 _____

8. 당신의 휘트니스의 소유형태는 ?

개인소유 _____ 시/도 지방자치단체 소유 _____ 호텔및 숙박시설 _____

비영리 단체 _____ 한국계 체인 _____ 외국계 체인 _____

9. 당신의 휘트니스 센터의 맴버가 되기 위해 확인하는 의료기록은?

50세이상 _____ 고혈압 _____ 높은 콜레스테롤 _____

비활동적 생활패턴 _____ 과거 심장병유무_____ 가족 심장병내력_____

10. 당신의 휘트니스 센터 맴버중 40대 이상은 몇 퍼센트를 차지합니까?
_____ %

PART B: 자동제세동기에 관한 지식 및 사용

1. 자동제세동기 (AED)와 관련된 '응급의료 법률'을 얼마나 알고 계십니까? (하나만선택)

법률적 면책조항에 대해 자세하고 알고 있다. _____

기본적인 법률의 내용을 숙지하고 있다. _____

관련법이 있다는 정도는 알지만 자세히는 모른다 _____

전혀 관련법에 대한 지식이 없다 _____

2. 자동제세동기에 대하여 더 알기를 원하십니까?

예 _____ 아니오 _____

"예" 라고 대답하셨으면, 다음중 어느 부분에 대해 더욱 알고 싶으십니까?

제세동기 효과 _____ 제세동기 목적 _____ 제세동기 관련 교육과정 _____

제세동기 가격 _____ 사용시 법적 책임내용 _____ 제조사 및 판매처 정보_____

그외 궁금한 내용

_____

3. 당신의 휘트니스 센터에서는 자동제세동기를 사용하고 계십니까?

예 _____ ---> C 와 D 파트를 답해주세요

아니오 _____ ---> C 파트는 답하지 마시고, D 파트를 답해주세요.

PART C: 당신의 휘트니스센터는 자동제세동기를 소유하고 있습니다

1. 당신의 휘트니스센터에는 몇대의 자동제세동기를 보유하고 계십니까?

_____ 대

2. 당신의 휘트니스센터에서 자동제세동기를 보유한 기간은 얼마나 되셨습니까? (하나만)

0 – 6 개월 _____ 7 - 12 개월(1 년) _____ 13 – 24 개월 (2 년) _____

25- 36 개월 (3 년) _____ 3 년 초과 _____

3. 당신의 휘트니스 센터에 자동제세동기를 사용토록 교육을 받은 정식 직원은 있습니까?

예 _____ "예" 라면 몇명이나 교육을 받았습니까? _____명

아니오 _____

4. 당신의 휘트니스 운영시간에 자동제세동기를 교육받은 직원이 항상 대기하고 있습니까?

예 _____ 아니오 _____

5. 당신의 휘트니스에서 응급상황시에 자동제세동기를 사용해 본적이 있습니까?

예 _____ 아니오 _____

6. 당신의 휘트니스에서는 자동제세동기에 대한 교육이 있습니까?

예 _____ 아니오 _____

"예" 라면 얼마나 자주 교육이 행해집니까?

직원/자원봉사자 채용시 _____ 매월 _____

매 2개월 마다 _____ 매 3개월 마다 _____

매 6개월 마다 _____ 매 1년 마다 _____

그외 _____

7. 당신의 휘트니스는 급성 심장정지 환자에 대한 응급처치 계획을 구비하고 있습니까?

예 _____ 아니오 _____

"예" 라면 직원들의 교육은 어떻게 행해집니까?

특별한 교육 없슴 _____ 직원/자원봉사자 채용시 _____ 매월 실시 _____

매 2개월마다 _____ 매 3개월마다 _____ 매 6개월 마다 _____ 매 1년마다 _____

8. 당신의 휘트니스센터는 얼마나 자주 관할 지역담당부서로 부터 자동제세동기에 대한 점검을 받습니까?

사고 발생시 _____ 매월실시 _____ 매 2개월마다 _____

매 3개월마다 _____ 매 6개월마다 _____ 매 1년 마다 _____

9. 당신의 휘트니스 센터는 지역 관할 지역담당부서로 부터 자동제세동기에 관한 자문이나 조언을 받습니까?

예 _____ 아니오 _____

10. 응급상황 발생시, 응급구조대(EMS) 가 당신의 휘트니스 센터까지 도착하는 시간은 대략 얼마입니까?

3분 _____ 5분 _____ 7분 _____ 10분 _____

15분 _____ 20분 _____ 확실하지 않음 _____

11. 응급구조대(EMS)가 당신의 휘트니스 센터에서 가장 가까운 병원 응급실까지 도착하는 시간은 대략 얼마입니까?

3분 _____ 5분 _____ 7분 _____ 10분 _____

15분 _____ 20분 _____ 확실하지 않음 _____

PART D 모든 설문지 참여자들은 응답해 주세요

당신이 인식하는 휘트니스센터의 자동제세동기를 제약하는 요소들은 무엇입니까?

문 항	전혀 그렇지 않다	대체로 그렇지 않다	보통 이다	대체로 그런 편이다	매우 그렇다
자동제세동기 구매 비용이 부담스럽다	1	2	3	4	5
자동제세동기 현장 교육비용이 부담스럽다	1	2	3	4	5
자동제세동기 관련 자격증비용이 부담스럽다	1	2	3	4	5
자동제세동기 기계 관리 비용이 부담스럽다.	1	2	3	4	5
우리 센터는 지역 응급구조대와 가까이있어 자동제세동기가 불필요하다	1	2	3	4	5
우리 센터는 낮은 급성심정지 사고 발생 확률로 인해 자동제세동기가 불필요하다	1	2	3	4	5
우리 센터는 충분한 사전 회원건강 체크로 인해 자동제세동기가 불필요하다	1	2	3	4	5
우리 센터는 심폐소생술(CPR) 만으로도 충분하기 때문에 자동제세동기가 불필요하다	1	2	3	4	5
우리 센터는 보호에 관한 법률상의 권리 포기로 인해 자동제세동기가 불필요하다.(그냥 사고보상하겠다)	1	2	3	4	5
자동제세동기와 관련하여 보험회사의 후원/지지가 부족하다	1	2	3	4	5
우리센터는 위험관리 담당 매니저의 수급이 부족하다	1	2	3	4	5
우리 센터는 자동제세동기와 관련된 지역행정부의 법률자문/조언이 부족하다	1	2	3	4	5
우리 센터의 주인의 자동제세동기와 관련된 후원/지지가 부족하다	1	2	3	4	5
우리 센터는 자동제세동기 구비 책임및 사고 보호에 관한 정보가 부족하다	1	2	3	4	5
우리 센터는 자동제세동기와 관련한 총괄 관리 책임자에 관한 책임규제 정보가 부족하다	1	2	3	4	5
우리 센터는 자동제세동기 관련된 필수 자격증과 훈련에 관한 정보가 부족하다	1	2	3	4	5
우리 센터는 자동제세동기의 필요성 및 기능에 대한 정보가 부족하다	1	2	3	4	5
우리 센터는 자동제세동기의 적절한 사용 및 조작에 대한 정보가 부족하다	1	2	3	4	5
우리 센터는 자동제세동기를 운영할만큼 센터내의 직원수가 충분하지 않다.	1	2	3	4	5
우리 센터는 자동제세동기와 관련한 현재 표준 활동규범이 충분하지 않다	1	2	3	4	5
우리 센터는 자동제세동기와 관련한 법적 소송에 대한 두려움을	1	2	3	4	5

가지고 있다					
우리 센터는 직원들의 자동제세동기 교육 및 활동 시간이 충분하지 않다.	1	2	3	4	5
우리 센터는 자동제세동기 사용상의 어려움을 가지고 있다.	1	2	3	4	5
우리 센터는 직원들을 위한 추가적인 자동제세동기 관련 자격증 및 교육이 충분지 않다.	1	2	3	4	5
자동제세동기로 인한 추가적인 관리 감독의 책임감 증가가 부담스럽다.	1	2	3	4	5
우리 센터에는 자동제세동기 관련 지도자가 부족하다.	1	2	3	4	5

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