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Title	Assessment of layperson knowledge of AED use in sports clubs
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Publication date	2021
Original Citation	Ryan, P., Twomey, G. and Falvey, É. (2021) 'Assessment of layperson knowledge of AED use in sports clubs', Irish Medical Journal, 114(7), P405 (9pp). Available at: http://www.imj.ie/wp-content/uploads/2021/08/Assessment-of-Layperson-Knowledge-of-AED-use-in-Sports-Clubs.pdf (Accessed: 12 October 2021)
Type of publication	Article (peer-reviewed)
Link to publisher's version	http://www.imj.ie/wp-content/uploads/2021/08/Assessment-of-Layperson-Knowledge-of-AED-use-in-Sports-Clubs.pdf, http://imj.ie/irish-medical-journal-july-august-2021-vol-114-no-7/
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Download date	2026-11-05 19:51:04
Item downloaded from	https://hdl.handle.net/10468/12088



UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Irish Medical Journal
Established 1867

Issue: Ir Med J; Vol 114; No. 7; P405

Assessment of Layperson Knowledge of AED use in Sports Clubs

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Abstract

Aims

To investigate knowledge and attitudes among sports club members toward AEDs, and to examine the potential benefits of an educational programme as an intervention for increasing awareness and willingness to use an AED.

Methods

A number of selected sports clubs were visited, and participants aged ≥16 were asked to complete a questionnaire relating to current awareness and attitudes toward AEDs, and their willingness to use the device. Each participant then attended a 2-hour small-group teaching session where they were educated on the role and use of an AED, with opportunity to practice AED use in a controlled environment. After receiving teaching, each individual again completed the questionnaire.

Results

142 people participated in the study. Before teaching, the average level of knowledge regarding AED use was relatively low. The most common reason identified for unwillingness to operate an AED was lack of knowledge on how to correctly use the device. Paired data analysis showed that attendance at a 2-hour educational programme led to a significant improvement in layperson awareness and understanding of AED use. After teaching, 77.5%(n=110) of participants reported that they would definitely be willing to use an AED, compared with 20.4%(n=30) before teaching.

Conclusion

A structured educational programme can increase layperson awareness, confidence and willingness to operate an AED.

Introduction

Sudden cardiac arrest (SCA) is a condition in which the heart suddenly and unexpectedly stops beating, and usually causes death if not treated within minutes[1]. In Ireland, SCA causes up to 5000 deaths each year, 70% occurring outside of the hospital setting[2, 3]. Global incidence of out-of-hospital SCA ranges from 20-140/100000 people, and national survival rates range from 2%-11%[3]. The current out-of-hospital cardiac arrest survival rate in Ireland stands at 6.4%[4].

AEDs have become increasingly available in sports and leisure clubs, allowing members to defibrillate with minimal delay if necessary. Early defibrillation for SCA improves the chances of successful resuscitation and survival[5-8]. Chance of survival from an out-of-hospital cardiac arrest falls by 7%–10% per minute that passes without intervention[9]. It is unclear whether members of the public are sufficiently prepared or willing to use an AED.

Prior to commencement of the study, a systematic review of existing international literature relating to this topic was undertaken[10]. It was found that there is a paucity of literature relating to layperson understanding of AED function and use[10]. A study of distribution of AEDs in amateur sports clubs in Cork encouragingly found that of the 218 amateur sports clubs randomly surveyed in Cork, 81.3%(n=126) owned an AED[11]. However, no data currently exists relating to layperson knowledge and attitudes toward AEDs in Ireland.

The primary objectives of the study were to investigate existing knowledge and attitudes among sports club members toward AEDs, and to examine the potential benefits of an educational programme as an intervention for increasing awareness and willingness to use an AED.

Methods

The study population was members of Cork GAA clubs aged 16 years and over. A standardized email was sent to the secretary of every GAA club registered in the East Cork and Cork City divisions. In total 49 clubs were emailed, of which 9 responded. Each club who expressed interest in taking part were included in the study. A total of 12 teaching sessions were delivered over a 2-month period in 9 different locations.

Participants aged ≥16 years were asked to complete a paper questionnaire relating to their current awareness of the existence, purpose and practical use of the AED within the club. The questionnaire also examined their attitudes toward AEDs, and their willingness to use the device. As no standardised, validated survey exists in relation to public knowledge and attitudes toward AEDs, we formulated a 25-part questionnaire using physician expertise, designed to target the key elements relevant to AED understanding and awareness. A pilot test of the questionnaire was conducted prior to use.

Each participant then attended a standardized 2-hour small-group teaching session at their club, delivered by the same qualified instructor, outlining the chain of response to a SCA as described by the AHA guidelines[12]. The learning outcomes for the course were recognising a cardiac arrest, efficiently alerting emergency services, performing hands-only CPR and understanding the role of an AED. Each participant was given the opportunity to perform CPR and practice AED-use on mannequins in a controlled environment. After receiving teaching, each individual again completed an identical questionnaire.

We compared individual questionnaire responses before and after attendance at the training course. The collected data was normally distributed, so a series of 'paired t-tests' were performed to investigate the effect of the intervention on participants' responses and to test the null hypothesis that training has no impact on participant knowledge.

Results

In total, 142 people took part in the study. Males accounted for 67.6%(n=96) of the subject-group. Age distribution of participants showed 11.3%(n=16) aged 16-18, 2.8%(n=4) aged 19-21, 3.5%(n=5) aged 22-30, 19%(n=27) aged 31-40 and 63.4%(n=90) aged>40 years. Participants' roles in their sports club were varied: Coach 39.5%(n=56), Player 19.7%(n=28), Parent/Supporter 19%(n=27), Committee-Member 18.3%(n=26), Other 3.5%(n=5).

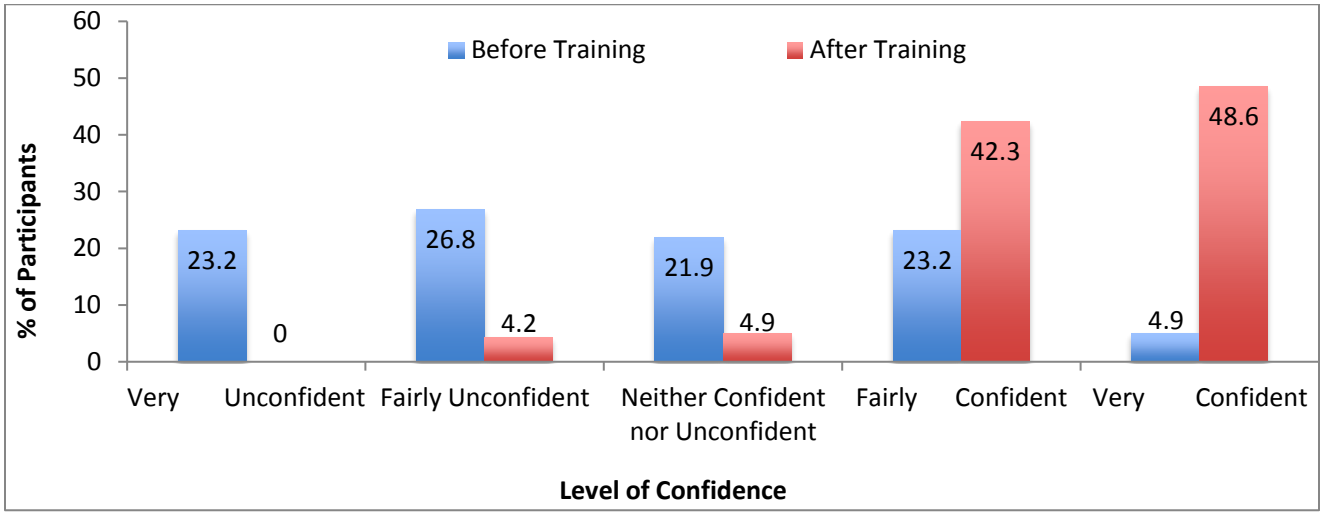
Twelve participants (8.5%) reported past experience of working in a healthcare capacity. Twenty participants (14.1%) had received some form of prior teaching in relation to AEDs. Twenty-four of those surveyed (16.9%) reported that they knew of somebody who had required use of an AED.

Regarding baseline awareness of AEDs, 98.6%(n=140) had heard of the term defibrillator while 64.1%(n=91) had heard of the term AED. 69 participants (48.6%) identified AED as meaning Automated External Defibrillator. 96 participants (67.6%) correctly identified the international AED symbol from a series of images.
Regarding access to their club's AED, 88.7%(n=126) of participants were aware if their club owned an AED, 62%(n=88) knew the exact location, and 20.4%(n=29) reported having the means to access/open their AED. 107 participants (75.4%) identified cardiac arrest as the most appropriate situation for AED-use from 5 optional scenarios. 30 participants (21.1%) identified the correct sequence of response to a SCA.

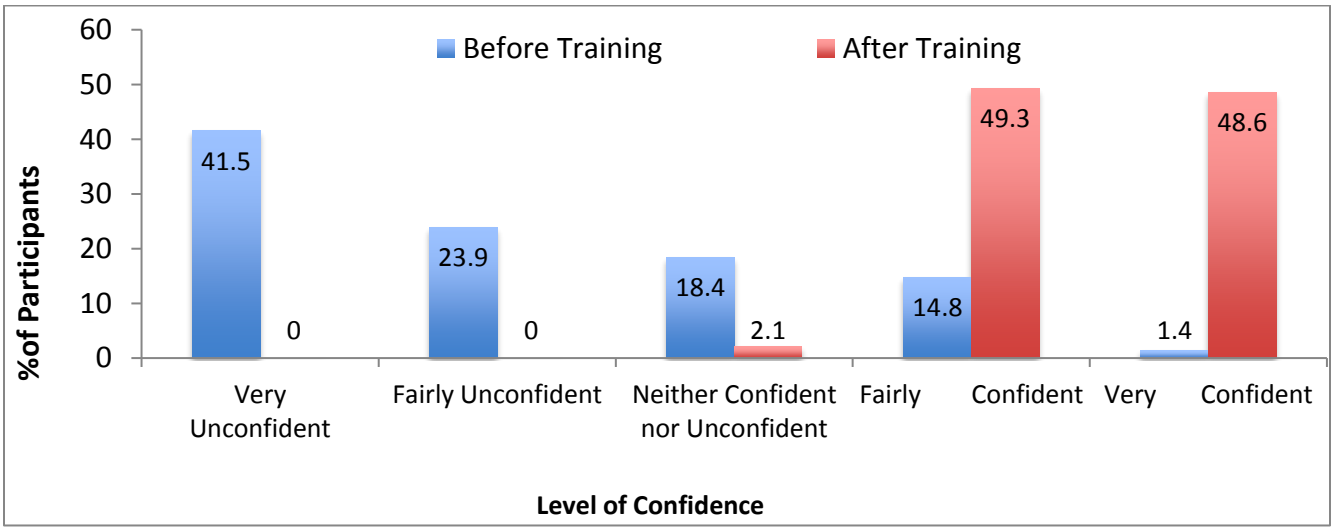
Regarding the function of the AED, 90.8%(n=129) selected that the AED starts the heart; 9.2%(n=13) selected that it stops the heart. After attendance at the 2-hour teaching session, 94.4%(n=134) correctly identified that the AED acts by stopping the abnormal electrical activity of the heart when it delivers a shock.

Participants were presented with a diagram of the chest and asked to select the two areas for pad placement. Before the teaching session, 10.6%(n=15) were able to correctly identify the appropriate positions for pad placement, compared with 93%(n=132) after teaching.

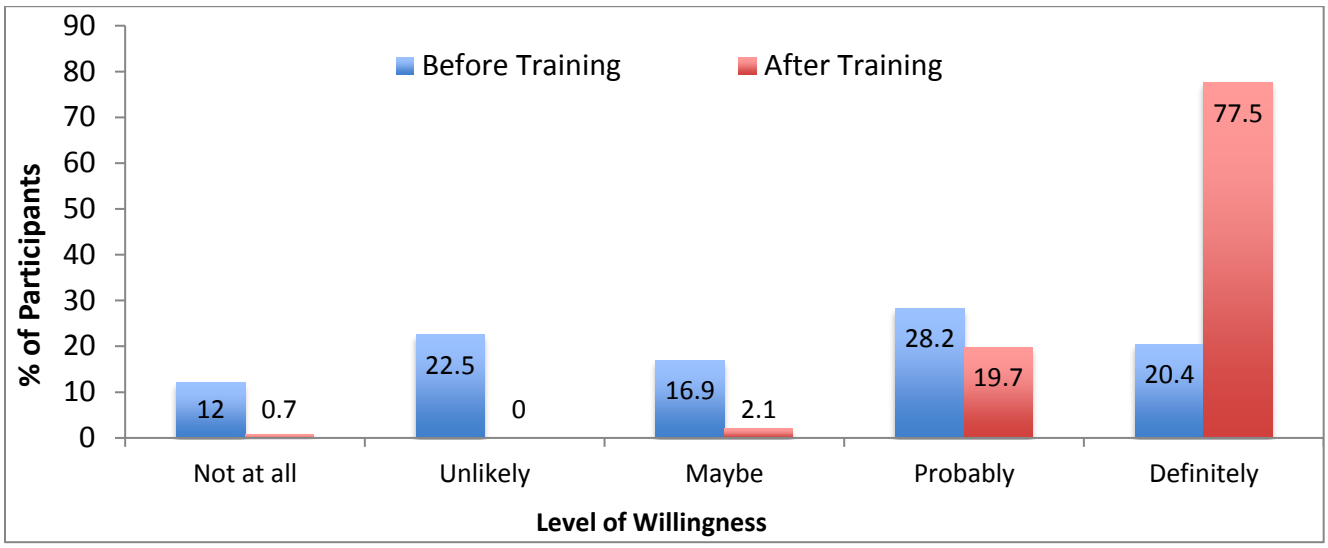
Participants were asked to evaluate their own confidence in their ability to access their club's AED in the event of a SCA. Participants were then asked to rate their confidence in their ability to correctly use the AED in the event of a SCA. Finally, we asked participants to evaluate how willing they would be to obtain and use an AED if a player required defibrillation during a match that they were attending. Participants' responses from before and after teaching are represented in Graph 1, Graph 2 and Graph 3.



Graph 1: *Confidence to Access AED.*

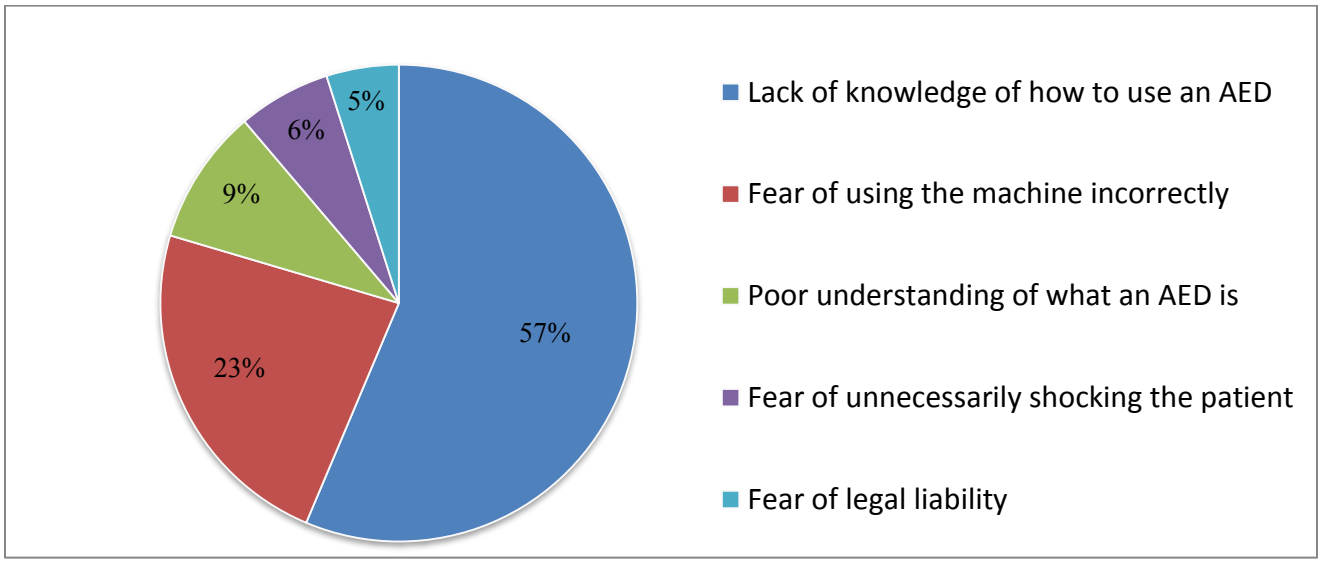


Graph 2: *Confidence to Correctly Use AED.*



Graph 3: *Willingness to Use AED.*

Prior to training, each study participant was asked to identify the main reason that they might be hesitant or unwilling to use an AED in the event of a SCA, and the results are displayed in Graph 4.



Graph 4*: Reason for Unwillingness to Use AED.*

All participants stated that they felt more people in the club should be educated on the purpose and function of the club defibrillator. As an additional aspect to the study, trained personnel inspected each AED, pads and storage-unit. It was found that 2 of the AEDs were out of battery, and 2 had pads that were out of date.

Discussion

Team coaches were the best-represented group at the teaching sessions. Only 2.8%(n=4) of participants were aged 19-21. Regarding death during sporting activities, it is this age group who are particularly at risk of SCA due to HOCM, which has an estimated prevalence of 1 in 500[13]. Further efforts are needed to target and inform this cohort of the role of the AED. These individuals are likely to be potential bystanders if a teammate collapses during training or a match.

Only 20.4%(n=29) of those studied reported that they had the means to open or access the AED, whether by key or using a PIN-code. Most AEDs are stored in locked cabinets for anti-theft and anti-vandalism reasons. However, the fact that only 1 in 5(n=29) reported being able to access the device if required was concerning. AEDs need to be clearly visible and stored in an easily accessible location.

More than 75%(n=107) of participants were able to correctly identify the recommended order of response to a SCA after teaching, compared with 21.1% (n=30) before teaching. This is a very encouraging outcome of the teaching programme. We also found a significant increase (>80%, n=117) in the number of participants who could correctly identify the correct positions for placement of AED pads on the chest. Pad-placement is an important aspect of efficient defibrillation and it was observed that only 10.6%(n-15) of participants could identify the correct positions on the chest. After teaching, 93%(n=132) of participants identified the correct pad positions. If larger numbers of the lay-population are more informed on performing good CPR and using an AED correctly as part of the chain of survival, it is hoped this will lead to improved outcomes from out-of hospital SCA[14].

Prior to training there was a large variation in participants' confidence to access an AED, with only 4.9% reporting that they were 'very confident'. The 'after-training' responses indicate a large increase in participants' confidence, with just under half reporting that they would be 'very confident' that they could access an AED if required to do so.

Before training, a large proportion of the studied population were not confident in their ability to use an AED, with 41.5%(n=59) reporting that they would be 'very unconfident'. After training, there was a significant increase in participants' confidence to correctly operate the device. Almost all (97.9%, n=139) reported that they would be either 'fairly confident' or 'very confident' to use an AED. Attendance at the 2-hour session led to a substantial increase in participants' confidence to both access and use an AED.

The key finding of this study relates to the willingness to use an AED. In order to improve the national out-of-hospital cardiac arrest survival rate of 6.4%, we need laypersons to be willing to attempt to use an AED to save the life of an individual who suffers a SCA[4]. In Ireland, AEDs have become increasingly available in public places and there has also been considerable investment in developing the National Ambulance Service to allow an appropriate emergency response, which continues right through to advanced in-hospital care.

However, these important measures are less effective unless they are incorporated into a structured chain of response where laypersons have adequate knowledge to use the AED effectively while awaiting medical support. The emergency services' ability to intervene is dependent upon and interconnected with the role of the layperson. Bystander CPR and early use of an AED are critical links in the chain, and it is imperative that the importance of the layperson in performing these roles is recognised, and that appropriate resources are directed toward public education.

Before training, we found considerable variation in participants' willingness to use an AED. A large proportion of the studied participants were unsure if they would try to use an AED. After teaching, 77.5%(n=110) of participants said that they would 'definitely' use an AED. This highlights that a structured educational programme can significantly increase layperson willingness to use an AED. Young adults were found to be very responsive to teaching; all participants (n=20) in the 16-21 age-category reported that they were both 'very confident' and 'definitely willing' to use an AED after training.

The primary reason for unwillingness to use an AED was 'lack of knowledge of how to use an AED.' Fear also played a role in some participants' unwillingness to use an AED: fear of using the machine incorrectly, fear of unnecessarily shocking the patient and fear of legal liability. Having identified why people are unwilling to use an AED, we can address these gaps in understanding and knowledge. We can allay their fears and concerns through targeted teaching, in order to further increase layperson willingness to use this important device.

Our study is limited by small sample size and sampling bias. Those who chose to participate in the study were likely to be more motivated or interested in AEDs than those who chose not to participate. Consequently data may overestimate the awareness of AEDs and the likelihood of use. Furthermore our survey could only measure what people said they would do, not what they would actually do.

Our results show that average levels of awareness and understanding of the role and use of an AED in the sporting setting are relatively poor. Previous research has indicated that extensive public education is needed before AEDs can be expected to maximize their public health influence[15-18]. AEDs must not only be placed in strategic locations such as sports clubs, but must be then complemented with practical training methods in order to realise their full benefit.

This study shows that a structured educational intervention leads to significantly improved knowledge of AED use, as well as increased confidence and willingness to use the device. If an educational course of this nature is implemented effectively on a broader scale through a strategic campaign then it is hoped that this will translate to the prevention of death in tragic circumstances, and long-term improvement in the out-of-hospital cardiac arrest survival rate. Attendance at a 2-hour educational programme led to a significant increase in layperson awareness and understanding of the role and purpose of an AED.

Further initiatives should include a broader range of sports-clubs and should be made accessible to laypeople in the community. Referees and players should be targeted as important subgroups to receive training. This programme could be considered as a module for second-level students. The establishment of nationwide AED registries would be beneficial for structuring and arranging the provision of an appropriate educational campaign like this.

Finally, the fact that 2 of the 9 sites surveyed had AEDs which were out of battery emphasises the need for regular maintenance and servicing of AEDs.

Ethical Approval:

Ethical approval for this study was requested and granted by the Clinical Research Ethics Committee of the Cork Teaching Hospitals, prior to commencement of data collection.

Declaration Conflicts of Interest:

There were no conflicts of interest to declare. There was no support from any organisation for the submitted work and no other relationships or activities that could appear to have influenced the submitted work.

Research Reporting Checklist:

The methods for the interventional component of this study were designed using the TIDieR (Template for Intervention Description and Replication) Research Checklist obtained from the EQUATOR network.

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