

Sudden Cardiac Death and Sports

A matter of public health

By Abhishek Muralidharan

This dissertation is submitted to the Cardiff School of Journalism, Media & Cultural Studies, Cardiff University, in partial fulfilment of the requirements for the Degree of Master of Science in Computational and Data Journalism.

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Declaration

C21092436

Muralidharan

Mr. Abhishek

This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

Signed: **Abhishek Muralidharan**

Date 13.10.2022

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This dissertation is being submitted in partial fulfilment of the requirements for the degree of M.Sc. Computational and Data Journalism.

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Statement 2

This dissertation is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references. A Bibliography is appended.

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Dedication

In memory of K Nagesh Iyer, Devarshi Patel and Joseph Humphries, all of whom passed away due to sudden cardiac arrests.

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Abbreviations

Arrhythmia

An arrhythmia, or abnormal heart rhythm, usually means the heart is beating too fast, too slow or irregularly.

Cardiomyopathy

Cardiomyopathy is a disease of the heart muscle which affects its size, shape, or thickness.

Cardiopulmonary Resuscitation (CPR)

It's when someone gives chest compressions to a person in cardiac arrest to keep them alive until emergency help arrives.

Cardiovascular Heart Disease (CVD)

Also called heart and circulatory disease, it is an umbrella name for conditions that impact the heart or circulation. These include high blood pressure, stroke and vascular dementia.

Coronary Heart Disease (CHD)/ Ischaemic Heart Disease/ Coronary Artery Disease (CAD)

When the coronary arteries become narrowed by a build-up of fatty material within their walls. These arteries supply your heart muscle with oxygen-rich blood.

Defibrillator

A defibrillator is a device that gives a high energy electric shock to the heart of someone who is in cardiac arrest. This high energy shock is called defibrillation, and it's an essential part in trying to save the life of someone who's in cardiac arrest. A defibrillator may also be called a defib, an AED (Automated External Defibrillator) or a PAD (Public Access Defibrillator).

Electrocardiogram (ECG)

It is a simple and useful test which records the rhythm, rate and electrical activity of your heart.

Heart Attack

It happens when there's a sudden loss of blood flow to a part of the heart muscle. Without enough blood and oxygen, the heart can be seriously damaged.

Heart failure

Heart failure is a condition where your heart can't pump blood around your body as well as it should. It doesn't mean your heart has stopped working, but you may need support to help it work better.

Preparticipation Physical Evaluation (PPE)

PPEs screen for a variety of conditions, including athletic heart syndrome and risk of sudden cardiac death.

Sudden Arrhythmic Death Syndrome (SADS)

In about one in every 25 cases of sudden cardiac death, no definite cause of death can be found. This is called SADS. It is a subdivision of Sudden Unexplained Death (SUD)

Sudden Cardiac Arrest (SCA) / Cardiac Arrest

Temporary or permanent cessation of the heartbeat

Sudden Cardiac Death (SCD)

Death occurring within minutes or hours following onset of acute symptoms of cardiac arrest resulting especially from an arrhythmia

Introduction

I was watching the live coverage of the UEFA Euro 2020 when the Danish-playmaker Christian Eriksen collapsed on the pitch due to a sudden cardiac arrest. It was a thought-provoking incident for me. I started pondering on the health and fitness routines of sports athletes.

When I explored this further, I realised that it is not just sports athletes, but millions of people dying of sudden cardiac arrest every year. While it is often underreported, sudden cardiac arrest is a health risk and has to be prevented wherever possible.

Thus, through this project, I aim to raise awareness about the importance of Automated External defibrillators (AED), heart screening, and the need for education and training on cardiopulmonary resuscitation (CPR).

Each of my stories has been written with the intention to raise awareness on sudden cardiac arrests, be it through the popularity of a sport such as football or through the lens of public health. The target audience for this project is the general population in the United Kingdom.

The first story focuses on raising awareness through football, the second focuses on the importance of education and CPR training, while the third story focuses on screening and conflicts of interests therein.

Context and Background

Cardiac arrest also referred to as sudden cardiac arrest (SCA) is a public health matter. According to a study published in Indian Heart Journal, it is estimated that every year, 7 million people die of sudden cardiac deaths worldwide (Abhilash & Namboodiri, 2014). According to the Office for National Statistics, cardiac arrest claims 41,568 lives every year in England and Wales (*Cardiac Arrest Deaths in England and Wales 2015 to 2021 - Office for National Statistics*, n.d.), and the USA witnesses 350,000 deaths every year (Meaney et al., 2013).

The most concerning thing about SCA, as the name suggests, is that it occurs suddenly, and sometimes without any underlying heart conditions, especially in young people. (Berdowski et al., 2010) There are two ways to reduce the number of SCAs – proactive strategies such as screening and reactive strategies such as cardiopulmonary resuscitation (CPR) and defibrillation.(Modesti et al., 2022)

Screening

Electrocardiogram (ECG) screening is proven to be the most successful method for screening so far. There are different laws in different countries for screening, for some it is mandatory such as Italy (Maron et al., 1996), and for some it is not mandatory such as the UK. Screening cannot detect everything, such as coronary artery diseases. Besides, some diseases can be acquired post screening (Corrado & Zorzi, 2017).

Reactive Strategies

The use of CPR and AED, given within minutes, can save many lives. A defibrillator is most effective when administered within the first minute of collapse. If used within the first minute, the survival rate can be high. The chances of survival drop by 7-10% every minute (Ibrahim, 2007).

Critical Review

Since sudden cardiac arrests pertains to the field of medicine, there are a number of studies and research papers published on it in the British Journal of Medicine (BJM), New England Journal of Medicine (NEJM), European Journal of Medical Research (EJMR), and American Journal of Medicine (AJM).

Heart-related and cardiac specific studies are available in the Journal of the American Heart Association, International Journal of Cardiology, and Journal of the American College of Cardiology. The British Journal of Sports Medicine (BJSM) and the Clinical Journal of Sport Medicine (CJSM), European Journal of Sport Science (EJSS) composed most of the research papers on athletes.

The studies related to sudden cardiac deaths published in most journals analysed the aetiologies (causes of death) in terms of geography (Mayer, 1981), ethnicity (Reinier et al., 2019), age, and sex (Goodwin et al., 2018). The studies are distinctive in terms of the methodologies used and the focus groups.

The cardiac specific studies focused on the analysis of each disease, for instance, cardiomyopathy or coronary heart diseases in a specific demographic of a country (Yow et al., 2022).

Numerous studies, published in BJSM, EJMR and CJSM, analysed sudden cardiac arrests and other heart-related problems in young athletes. The studies differed in terms of the nature of the sport (Wasfy et al., 2016) and the demographics that play it (Yow et al., 2022). The focus groups ranged from professional to high school athletes. CJSM comprised more of basketball-related sports due to the popularity of the sport in the country (Wasfy et al., 2016), meanwhile BJSM and EJMR had more of the football related studies.

The studies on preventing sudden cardiac arrest deaths focused on the use of Automated External Defibrillators (AED), the role of CPR (Carrington et al., 2022), and the parameters involved in heart screening. The screening studies majorly

focused on Electrocardiogram's (ECG). The analysis of screening focused on reducing the sensitivity of the process and eliminating false-positives (Steinvil et al., 2011).

In regard to AEDs, the studies looked into the risk assessment, cost-effectiveness, and public health factors of defibrillators. One study published in The European Resuscitation Council's journal, *Resuscitation*, provided insights on the disproportionality of AED locations in the UK (Brown et al., 2022).

Football specific studies published in BJSM and NEJM on sudden deaths focused on aetiologies on the basis of demographics and geography (Egger et al., 2022). In terms of preventive measures, one BJSM study focused on the emergency medical facilities available for English football clubs (Malhotra et al., 2019), a study in NEJM was published on the screening of adolescent football players (Malhotra et al., 2018).

In terms of media, the coverage about incidences of sudden cardiac arrests in sports was limited to famous athletes. The trend was of correlation between previous sudden cardiac arrest deaths and survivals with any recent occurrence (Aziz, 2021). There is very limited media coverage on the medical parameters and aetiologies of sudden death in football.

During the pandemic, there were a range of articles published linking the Covid-19 virus, vaccines and sudden cardiac arrests. Some of them focused on the virus triggering arrhythmia (Muhammad et al., 2021) and myocardial infarction (Kumar et al., 2021).

A range of awareness and campaign-related articles have been published by not-for-profit organisations and charities to highlight the importance of CPR training and AEDs (*Importance of CPR and AED*, n.d.).

Data Review

There are no publicly available datasets on sudden deaths in footballers except for one in Kaggle. The dataset had a few shortcomings. The source mentioned in the dataset was the FIFA Sudden Death Registry, however, the number mentioned in the registry's study methodology (617) was not the same as the number mentioned in the dataset (230).

Misinterpretation of the same registry was also seen in social and digital media. A July 2022 piece in the mirror mentioned, "it was determined that 617 footballer deaths had been attributed to cardiac arrests during the period in question" (Victor, 2022). This was inaccurate, as 617 was the total number of deaths, not the ones attributed to sudden cardiac arrests.

The dataset had other limitations such as the timing of the incident of the player's death or the response time of the medical staff wasn't mentioned. There was also no mention on the player ethnicities, and it lacked clarity on the subject as the matrices 'collapse', 'cardiac_related' 'heart_related' had disproportionate inclusions without any information (Heart attacks can lead to cardiac arrests, which results in a collapse on the pitch).

In terms of defibrillators, there is no publicly available data on the number of defibrillators available in the UK, I found a dataset of this sort about the availability of the equipment in France.

The National Defibrillator Database – The Circuit, Heartsafe's AED, and Open Street Map provided the locations of publicly available defibrillators in the UK, however it does not show if they are available in sports, business parks or other private facilities in the UK. There was one dataset available in data.gov.uk where the Leeds city council had uploaded defibrillator locations in its area.

There were datasets available at the Office for National Statistics (ONS) regarding the cardiac arrest deaths in the UK, while the British Heart Foundation comprised key

facts and figures. The studies published in the British Journal of Medicine, New England Journal of Medicine, and American Journal of Medicine, had research data.

There were three recent FOI requests as well regarding the availability of defibrillators in sports facilities, which provided an update on the count of football clubs who registered a government AED fund (1,538).

Methodology

My first step was talking to people, not just for interviews, but to get more understanding on the subject at hand. I was able to connect with a former footballer, who currently runs a charity for sudden cardiac arrest deaths. The conversation helped me to understand the global picture and analyse things from both micro and macro perspective.

The next step was research. I read over 40 research papers in order to get a deep understanding of the topic. As I dug deep into each aspect of the preventive measures for sudden cardiac arrest deaths - proactive strategies such as screening, and reactive strategies such as AEDs and CPR, I realised that I could write a standalone piece on each topic stitching it to one theme - sports.

Interviews

I interviewed a diverse range of people to get comprehensive insights for my story. My interviewees include a former footballer, a chief executive of a screening charity, a cardiologist who's an expert in the field of sports science, a senior resuscitation officer, and an athlete who survived cardiac arrest. This enabled me to cover all the aspects involved in the topic - and most importantly, a human interest factor.

The interviews were established by contacting the press offices, through colleagues and relatives. Besides, one contact led to another.

Data collection and analysis

Due to limitations on publicly available data on football related sudden deaths, I had to rely on media-based reporting for data collection.

I realised that most football player names (published in the media) who suffered a sudden death while playing football were available on a Wikipedia page (List of association footballers who died while playing). The page was constantly being updated, as the most recent names appeared in it as soon as the incident occurred (Latest 14th September and 30th September 2022).

I imported the available names from the page. To ensure the credibility of data, using the Octoparse web scraping tool, I retrieved information about football players who encountered a sudden death (heart-related and non-heart related) playing or training on the field from the Google search engine. I looked for specific keywords such as “Football”, “heart attack”, “cardiac arrest”, “training” and “match”. The scraped data provided me with a dataset with the articles and a brief description on it.

I manually cross-checked each article to find out if any players were missed from the scraped dataset, and included names and subsequent information to it. I stuck to the original methodology used in the registry, such as players who did not die after or within 1 hour after training were excluded from the dataset. I have also simplified the matrices and added notes to provide clarity about the dataset in terms of its sources and quality (for future publication purposes I published it on Kaggle).

As there were less variables in the dataset, Spreadsheets holded sufficient to analyse the data. As the data at hand was limited and did not represent the absolute number of sudden deaths, I decided to show it as a media trend, which held credibility.

Website and visualisations

For the visualisations, I used Tableau for creating a basic bar chart, as it fits the purpose of the data representation. Meanwhile, for creating the timeline, I used Visme, as it had a good interactive template for timelines, however as the visualisation did not align with the nature of my first story, I decided to use it just for my website.

To create this website, firstly, I created a virtual environment using Anaconda on my local system. Then I downloaded the dependencies/python libraries - streamlit, pydeck, and protobuf.

Apart from the main page which contains the radio buttons, I created three pages – contact.py, article.py and home.py. The home page contains a brief description about the website, the article page contains my first story. In the article page, I have

embedded the Tableau and Visme visualisation using the streamlit HTML component. The embedded code was provided by the Tableau and Visme dashboard.

The contact page just has my contact details. I then published the code to master branch in GitHub using the commands – git add, git commit and git push. Lastly, I connected my GitHub account to streamlit and deployed the repository using my streamlit account.

Link to Dataset

<https://kaggle.com/datasets/44b231b6fd96416fc6806563cdd74b487f00cf2faea4725ffc82cb25fbcfcaa8>

Link to Website

<https://abhishek17abk-football-cardiac-arrests-streamlit-app-h5y65t.streamlitapp.com>

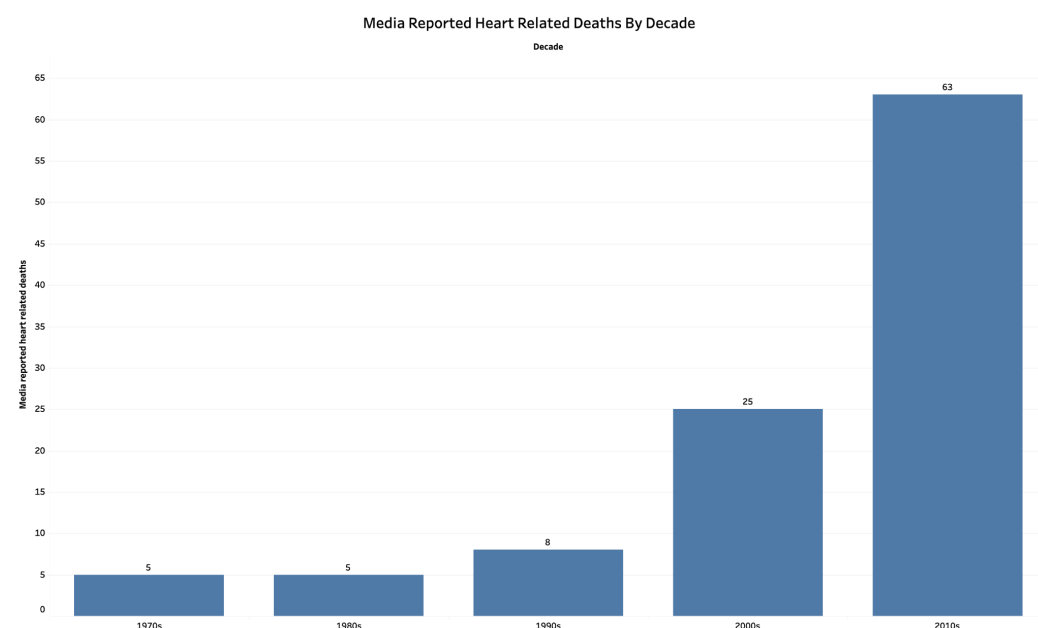
Football's popularity, cardiac safety awareness opportunity

Medics see football's heart problem as chance to educate

Romanian club Inter Cristian's 33-year-old Alexandru Vagner passed away on 30th September 2022 after suffering a heart attack during a training session at the club's facility. His death is just the latest example of a footballing sudden death, but it's a problem that's raising eyebrows both on and off the pitch.

The most renowned case occurred in the Euro 2020, when the Danish-playmaker Christian Eriksen was resuscitated after suffering an on-field cardiac arrest in a group stage match against Finland. He was given cardiopulmonary resuscitation and was later fitted with an implantable cardioverter-defibrillator, and returned to football eight months later, eventually playing for Manchester United.

A dataset was compiled by a fan (me) with the help of various media reported sudden deaths in football. The analysis of this data provided some interesting insights.



Media reported deaths see an upward trend: <https://tabsoft.co/3EEHrMU>

Most reported deaths (137 of 263) were attributed to heart-related conditions, and almost half of these heart-related sudden deaths (63 of 137) occurred in the last decade alone (2010-2019). In the current decade, the number of deaths reported has shown a further upward trend, with 25 deaths reported in just the last three years.

The data is crude and might be inconclusive in terms of the coverage of all occurrences of deaths, but it does raise questions about whether the situation is improving or not.

The problem of heart-related sudden deaths has also been the subject of study for many sports bodies and academic researchers. A 2020 study by Saarland University found that 76% of footballers under the age of 35 who encountered a sudden cardiac death had coronary heart disease.

Football associations have been trying to reduce heart-related incidents with initiatives such as the FA's mandatory cardiac screening programme (1997), and pre-competition medical screening mandate (2006).

The international football body's Pre-Competition Medical Assessment comprises a physical examination, an ECG, and an echocardiography to check for heart-related abnormalities. According to a study published in the British Medical Journal (BMJ), this cross-disciplined medical examination is the best approach to check for heart-related irregularities in sports athletes.

However, in a study published in the New England Journal of Medicine, in which FA's 1997 screening programme was analysed, 75% of players who died of sudden cardiac arrest had no symptoms during screening. "In some cases, one cannot identify everyone at risk of sudden cardiac death, 80% of young individuals who die during exercise due to cardiac arrests never have symptoms, or a family history," Dr Harshil Dhutia, consultant cardiologist, Glenfield Hospital, University hospitals of Leicester.

Besides these undetectable heart abnormalities, events can happen on the football pitch, such as the football hitting the chest or physical contact with a player that can contribute to sudden cardiac arrest.

Some causes of sudden cardiac arrest are not necessarily inherited and can be acquired after people have been screened. For instance, in January, the player's report would have looked normal, but he might have acquired a heart disease in March.

Viral infections affecting the heart muscle, which received a lot of attention during the pandemic, is one of the best examples of acquired heart conditions that can lead to sudden cardiac arrest.

“It's really important that people are aware of symptoms and family history from screening, but they also need to be made aware of the limitations of screening. Thus, one can't emphasise enough the importance of automated external defibrillators (AED) and cardiopulmonary resuscitation (CPR) training,” says Dhutia.

The Saarland University study shared one key statistic: CPR resulted in a survival rate of 85% with the use of an AED, compared to 35% without.

The government's sport ministry (DCMS) now obliges its community sport body Sport England to only award grant money to venues that provide AED. A press release from The Digital, Culture, Media and Sport department said, “At the grassroots sport level, all capital funding awards for sports venues made by Sport England must include AED provision if it is not already available”.

Sport England along with the FA have set up a fund to provide 2,000 AEDs to grassroots football clubs and according to a recent FOI request, 1,538 applications from local clubs have been received till April.

A study funded by the FA which Dhutia co-authored shared that most clubs in all divisions of the English Football League have satisfactory medical provisions,

including the availability of AEDs on match day. However, the study identified a gap in the cardiovascular safety of footballers in the lower divisions.

In contrast to the Premiership where all clubs provided AED training to designated staff, almost 30% of clubs in the lower divisions had available devices but no training for the staff. “Necessarily, there’s no problem at the highest level of sport. The issue lies whether there is equitable care and availability and training at lower levels of sport, particularly grassroots, recreational and school sport. It’s nowhere near the level of the highest level of sport,” says Dhutia.

He adds, “It’s really important for those who do have AEDs to understand that it’s not just about having an AED, it is about getting regular training, making sure staff are updated.

For example, in hospitals, doctors and hospital nurses and healthcare professionals have a requirement for periodic training, even though they perform these procedures such as resuscitation frequently.

This Saarland University study also highlighted the need for staff CPR training along with immediate access to AEDs as a key to maximise the survival rates.

Dhutia debunked the misconception among people that such conditions affect only athletes. “These are genetic conditions, so they do not have a unique prediction for competitive sport, people think it only happens to athletes due to the media coverage, whereas it can impact anyone.”

As the majority of deaths occur among the general population, it may not get the same media attention as athletes, Dhutia feels, “We’re probably looking at an under-representation, yet the actual number of deaths are likely to be higher.

A study published in The European Resuscitation Council’s journal, Resuscitation, explains how the football media can be used as a platform to raise awareness on sudden cardiac arrests. “The surge of public emotion in response to the sudden

heart attack of Christian Eriksen can be used as an example to support the logic of CPR education.”

FIFA’s estimate of 443 million football fans suggest that there is a huge audience where awareness can be raised. The vast popularity of the sport can become a driving force to raise awareness on strategies to prevent deaths from sudden cardiac arrests.

CPR Education and access to AEDs, key to cardiac arrest prevention

Institutions safeguarding public health strive to create equitable access to lifesaving procedures

The second reading of the Public Access of Automated External Defibrillators Bill took place on 9th September 2022, the bill aims to increase the availability of defibrillators in public places in the UK. In July, the government made the installation of defibrillators in school buildings mandatory from the end of next academic year (2022/2023).

These are signs of development, however, the availability of AEDs alone won't solve the problem of sudden cardiac arrest.

According to a survey by Vitreous World, 62% of people do not know where their nearest AED is. Meanwhile, 42% said that the biggest reason impeding people to purchase a defibrillator was the cost (£750 to £1,300)

The survey also highlighted that 53% of people did not know what to do when they observed a sudden cardiac arrest, and 41% were afraid to use AEDs due to lack of training.

This infers that the problem that impedes the accessibility of AEDs is three-fold. Defibrillators not registered in the British Heart Foundation's (BHF) national defibrillator database – The Circuit, the inflated cost and most importantly, the lack of education and training.

According to recent estimates, 100,000 AEDs are available in the UK, however, as the survey identified, the current issue is not the number available, it's the number accessible to the public.

In an event of a cardiac arrest, someone who's been at resuscitation, or if there's another person available to call 999, the first thing they ask for is the address to locate the nearest AED. Thus, it is essential that the hospital services are aware of the AED locations, which can be achieved if they are registered in The Circuit.

The Jo Humphries Memorial Trust (JHMT) is a charity that has been trying to raise awareness on sudden cardiac arrest deaths since the last decade. Steve Humphries, the founder of the charity, believes that over 50,000 AEDs are yet to be registered in The Circuit.

In terms of cost, AEDs are priced from £750 to £1,300 each in the UK, which is a considerable amount for the general population and many people are now collecting funds to install defibrillators in their locality. "A major reason for this inflated cost could be the 20% Value Added Tax (VAT)," says Humphries.

Besides the availability and cost, registration in The Circuit enables the AEDs to be maintained, as the equipment is at a public place for years, maintenance is an essential need.

Another issue is that the AEDs are disproportionately located. According to a recent study published in the British Medical Journal (BMJ), the majority of registered AEDs are found in urban areas in light of high population density, but this is not reflected in impoverished high density areas. Although the majority of sudden cardiac arrests occur in residential settings, there are fewer AEDs available for public access in these areas.

In the Northwest, a lot of people are lobbying the city council at a political level, to make different places available, where there is inequity in care. For instance, in any new buildings being developed for example, as well as a fire extinguisher, defibrillators are a mandatory requirement for any new development.

Humphries, who also works for the Leicester City council, is striving to make this work. "We can ask the builders to think out of the box and collaborate with the

council to help them with the process. Defibrillators can be installed at street lighting facilities, which can supply electricity to maintain them.”

A range of charities, organisations such as the BHF and even football associations have been campaigning to raise awareness on the topic. Most of them provide free 15-30 minute online learning courses.

Along with other charities, the BHF was instrumental in the implementation of first aid and CPR education onto the school curriculum in England in September 2020. CPR training has been added this year, and Wales and Scotland will follow suit.

Dr Harshil Dhutia, consultant cardiologist at Glenfield Hospital, University hospitals of Leicester, says, “It's really important that we keep emphasising that education is key. Learning about CPR and AED is not difficult. It does not need to be a healthcare professional, anyone can do it, because it may be too late by the time a paramedic crew comes.”

About three years ago, 15-year-old Saskia Holland, from Nottinghamshire, had a cardiac arrest during a netball match in September 2019. With quick CPR attention and defibrillator shocks, the bystanders were able to resuscitate her.

The CPR and defibrillation continued for ten minutes until an ambulance arrived. Holland was fortunate, as for every minute in a cardiac arrest without CPR and defibrillator treatment, the chances of survival decreases by 10%.

Holland said that there were no previous symptoms that triggered the cardiac arrest. Like her, many young people don't have any symptoms of sudden cardiac arrest. “Around 12-16 young people (under the age of 35) in the UK die suddenly from a previously undiagnosed heart condition, 80% of these deaths will occur with no prior symptoms. We're talking about decades of loss of productive life, it is not something that we should take lightly,” says Dhutia.

“On the other hand, if resuscitation along with AED and CPR is commenced within the first three to five minutes after a cardiac arrest, there have been reports of

survival to hospital discharge with excellent neurological outcomes in up to 70% of people,” he adds. The chances go as high as 90% if the treatment is provided within a minute.

Not everyone is as fortunate as Holland, as there are over 30,000 out-of-hospital cardiac arrests a year in the UK, out of which just one in 10 survive.

Heart irregularities, end of a sports career

A look at the screening laws in the UK and Italy for sports athletes

When Danish-playmaker Christian Eriksen suffered a sudden cardiac arrest during a Euro 2020 group stage match against Finland, medical experts predicted that he could never play again. Today, he is playing at Manchester United, one of the most successful clubs in the world.

However, when the horrific incident happened, he was playing for the Italian club Inter Milan, for which he can never play again as he is fitted with an Implantable Cardioverter Defibrillator (ICD).

The Italian pre-participation screening programme mandates that every competitive athlete must undergo annual pre-participation evaluation to identify cardiovascular diseases that pose a risk of sudden cardiac death.

In countries such as the UK or the USA, there is no such screening law in place. Cardiac Relief for the Young (CRY), a British charity that provides subsidised screening, has been recommending to make this law mandatory in the UK for a young demographic.

However, in the UK's National Screening Committee report 2019, the government questioned the accuracy and efficacy of screening, the sample size of young people (1-2 cases per 100,000 person-years of ages between 12-39).

It also raised the issue of long-term effects of not playing the sport and the mental effects if screened positive with low predictive value (a large proportion of those with positive screening tests will inevitably be found not to have the disease upon further diagnostic testing) as a concern among other factors.

CRY's chief executive, Dr Steven Cox, disagrees with the report. "He says that a 12-lead ECG test is currently recognised by experts worldwide as the most accurate

method for identifying cardiac abnormalities and signposting a need for further investigations such as echocardiography scanning, MRI and genetic testing.”

The Italian screening programme also employs ECG for its screening. According to a study published in the Italian medical journal JAMA, the annual incidence of sudden cardiac deaths among athletes dropped by 89% between the pre-screening and late-screening periods after the programme’s employment.

The NSC believes evaluating the efficacy of screening to be a key factor for not mandating the screening law.

Consultant cardiologist at Glenfield Hospital, University hospitals of Leicester, says, “It has been reviewed at government level previously, and it was felt screening is not as accurate enough or cost-effective enough to be laid out at a national level, compared to other screening programmes such as breast cancer.”

Any screening programme has limitations, be it for breast cancer or heart-related diseases.

In terms of the sample size, Cox estimates the incidences of young sudden cardiac death to be at least 10-fold, and almost 100-fold for high risk groups. “We believe that there is a fundamental misunderstanding among the NSC on the epidemiological data of how many people are affected with these sudden cardiac deaths.”

Dhutia also concurs that the numbers could be underreported.

The NSC reports long-term’s analyses included the mental impact of follow-up tests leading to anxiety or a reluctance to engage in sporting activity, even after disease has been ruled out.

However, the Italian study identified the exclusion of 879 athletes from playing sports due to the screening law. This exclusion criteria was one of NSC’s considerations for withholding the new programme.

According to a poll that was recently issued by the National Collegiate Athletic Association (NCAA), 51% of deaths were accidental. In addition, there were 9% of fatalities that were caused by suicide and 8% by homicide, making the overall number larger than deaths caused by cardiovascular disease (16%).

A study published in the Journal of the American Heart Association highlights that active engagement in sports, including but not limited to competitive sports, lowers the incidence of suicidal thoughts and behaviours.

Dhutia says, “In the UK, patient autonomy is really important. We inform individuals with cardiac disease of the risk of exercise. But at the end of the day, we would support individuals to undertake exercise as long as they are made aware of the risk. We're quite patient-centric, because the benefits of exercise are unbelievable.”

He adds, “We really have to take into account what the risk is. It's very difficult to label all individuals, paint everyone with the same brush, it's not to look at the type of sport they play, the level of sport, the level of access and the type of condition because not all conditions cause sudden cardiac death and have the same risk.”

The decision to prohibit people participating in sports should be carefully evaluated post hand. On one hand, vigorous exercise can lead to sudden cardiac arrest, while on the other hand, not enough physical activity can hurt mental health - It is important to find a balance between the two.

Conclusion

My findings for this project firstly includes, there have been more media reported deaths in the past decade in comparison to the previous ones and there is an upward trend.

As there is no registry for sudden deaths in countries such as the UK, much academia relies on media-based inputs for data on sudden cardiac arrest deaths in football. This does not hold successful as a reliable methodology.

There is disparity in the higher and lower division leagues in terms of the emergency services provided. And there is disproportionality in the locations where AEDs are located in the UK. Sudden cardiac arrest is a public health crisis, and it is underreported in a young demographic in the UK. Heart-related fatalities get less attention in the media than other causes of death.

The popularity of football can be instrumental in raising public awareness. However, due to the less availability of football medical data, a lot of facts in the media are misreported.

Lastly, there is no all-in-one solution to prevent someone from exercising if encountered with heart irregularities, as a lot of human factors have to be considered.

With this, I conclude that I have tried to work on this project showcasing the best of my abilities. I believe that I have deployed the best of journalism skills to make the terminologies used in a complex field such as medicine assimilable for readers. I have been able to successfully use data and programming skills I acquired in this course – building, interpreting, and analysing a dataset, and the deployment of visualisation tools. Likewise, I also believe that I have been successful in raising awareness on the public health issue of cardiac arrest.

Critical Reflection

Ideation

My initial idea for the project was to bring attention to the less popular players who died of cardiac arrest, create profile pieces with anecdotes of their family members. I also wanted to investigate the causes of sudden cardiac deaths, to analyse if there are any demerits of vigorous exercise.

One key learning from the assignments and projects in previous modules was the importance of discussing the topic with people. Doing so, I got a contact from one of my batch mates which was instrumental throughout this project.

A brief chat with the contact enabled me to understand that sudden cardiac arrest is a public health risk. He highlighted the importance of prevention and the role of AEDs. The conversation changed my narrative towards this project.

However, this was my biggest challenge – to link my new narrative with the sport of football in a manner that could spread a message.

Challenges

As most media coverage related to football does not involve the medical aspects of the sport, I had to solely rely on academia and my interviews to develop my articles.

I am less aware about the medical terminologies, thus, going through over 40 research papers was challenging for me. The first step for me was learning about heart diseases. However, the extensive research panned out well, and I had more angles to the articles than I earlier thought.

This extensive research also became a challenge at times. When I had to dig deep inside the specifications of a certain medical aspect of technology such as ECG, I didn't know to what extent I should explain it for a wider audience.

In terms of data, I always knew that data collection for a topic such as football was going to be difficult. While I was able to scrape a sizable amount of data, there are limitations to it, such as the lack of multilingual media reported death count.

Forward outlook

I would like to build a website to raise awareness on public health through my stories and use it as a platform to increase the defibrillator registrations in The Circuit in collaboration with the British Heart Foundation.

I will also use it as a tool for primary data collection from user inputs on sudden cardiac deaths in the young, as it is often underreported.

Since there is limited data available on the medical aspects of football, many researches are dependent on media-reported analysis. Thus, until there are developments in national record keeping, I would be keen on publishing more datasets on the topic through scraping methodologies, including more multilingual keywords to improve accuracy.

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Appendix: List of Interviews

Interview one

Interviewee: Dr Harshil Dhutia, consultant cardiologist, Glenfield Hospital, University hospitals of Leicester

Subject: Discussion on his research papers about the preventive measures in football

Date: 05.10.2022

Duration: 30:02 minutes

Location (platform): Zoom call

Language: English

Interview two

Interviewee: Dr Steven Cox, chief executive, Cardiac Relief for Young

Subject: Discussion on screening for young age groups and understanding European screening laws

Date: 07.10.2022

Duration: 17:04 minutes

Location (platform): Phone call

Language: English

Interview three

Interviewee: Steve Humphries, former, Leicester City footballer, founder, Jo Humphries Memorial Trust

Subject: The role of defibrillators in a public setting and sudden cardiac arrest awareness

Date: 02.10.2022

Duration: 24:03 minutes

Location (platform): Phone call

Language: English

Interview four

Interviewee: Dr Steve Rochester, senior resuscitation officer, Eastbourne
Healthcare Solutions

Subject: Education on the use of defibrillators and CPR training

Date: 06.10.2022

Duration: 19:17 minutes

Location (platform): Over social media - Zoom call

Language: English

Interview five

Interviewee: Saskia Holland, young ex-netball athlete, Tollerton,
Nottinghamshire

Subject: Understanding the human factors of overcoming a
defibrillator resuscitation for an athlete

Date: 10.10.2022

Duration: 7:01 minutes

Location (platform): Zoom call

Language: English