

Awareness of the Importance of Cardiopulmonary Resuscitation Skills Following the Sudden Cardiac Arrest of Damar Hamlin during a Buffalo Bills Game

Puja Sengupta, Mariana Adieb, Simona Maksimyan, Maxim Crasta*

Lake Erie College of Osteopathic Medicine, Elmira, NY, USA

Email: *mcrasta@lecom.edu

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Abstract

Background: Cardiopulmonary resuscitation (CPR) is a life-saving skill that is often overlooked until a tragic event occurs. A popular NFL player, Damar Hamlin, safety for the Buffalo Bills, suffered a cardiac arrest on January 2, 2023. Due to prompt intervention and CPR, Hamlin survived the arrest and is playing again. This research sought to understand how people respond to this event on the internet. It also seeks to understand how this response can be used to raise CPR awareness. **Design and Methods:** Using Google Trends and Twitter data, we searched, downloaded, and retrospectively analyzed search interests relative to Hamlin's cardiac arrest for a one-year duration. We searched for related keywords in the United States from March 2022 to March 2023, including "Damar Hamlin", "sudden cardiac death", "heart attack", and "CPR". **Results:** There was a significant rise in post-event Google searches that combined the terms "Damar Hamlin" and "SCD" ($M = -28898.88$, $SE = 1537.66$; $t = 1.62$, $p < 0.05$, $df = 119$), as well as statistical significance for CPR ($M = -21.21$, $SE = 0.56$; $t = -37.9$, $p < 0.001$). The news had a significant impact on public awareness of cardiac arrest and CPR after the incident, as evidenced by Google and Twitter activity. **Conclusion:** Based on the analytics of these platforms, it can be concluded that there were active discussions and an awareness of life-saving skills such as CPR along with Hamlin's cardiac event by his fans, as demonstrated by the data gathered from these platforms. This can provide us with valuable insight into human behavior and help us leverage this knowledge to promote health.

Keywords

Sudden Cardiac Death, CPR, Heart Attack, Damar Hamlin

1. Introduction

Sudden cardiac death (SCD) is a major public health problem [1]. A cardiac arrest is a time-sensitive situation, and the sooner cardiopulmonary resuscitation (CPR) is started, the better the chance of survival [2] [3]. Out-of-hospital sudden cardiac arrest (SCA) can occur in inopportune times where patients who receive bystander CPR have an increased survival [4]. Ventricular fibrillation and ventricular tachycardia are the two most common arrhythmias that lead to SCD. The chance of survival decreases by 7% - 10% every minute that CPR or defibrillation is delayed after the initial collapse. Providing the first CPR to a patient suffering from cardiac attack in the hospital is crucial for improving the outcome [5]. Prompt CPR has been shown to increase survival rates after SCA, emphasizing the importance of fast response times and appropriate medical attention [6].

Despite significant advances in medical technology and emergency response protocols, low rates of bystander CPR, limited use of automated external defibrillators (AEDs) and dismal survival rates indicate that there is still much room for improvement [7]. It is possible to improve survival rates and to increase public safety by increasing bystander CPR and the use of AEDs [8]. The public needs to be educated about the importance of bystander CPR and AED use by public health campaigns. Furthermore, they are essential for increasing awareness of cardiac arrest and stroke symptoms.

Public interest in the well-being of high-profile athletes is likely to spike if the athlete is injured [9]. The opportunity may be used to promote CPR meaningfully. In one study, researchers analyzed the change in public interest after season releases of popular shows with a main actor who has cleidocranial dysplasia. They found a 94% increase in cleidocranial dysplasia searches on Google following the episode's release [10]. This suggests that actors, athletes, and famous individuals are likely to play a role in educating the public on specific diseases and life-saving treatments.

Twitter is a popular and free social networking platform that allows users to easily communicate with each other. Because tweets can be re-tweeted, they spread quickly and broadly. Twitter posts are public and searchable, which makes them an excellent way to spread awareness about critical topics. By sharing posts about CPR, Twitter users can alert their followers to the life-saving benefits of learning this skill. Additionally, Twitter is a great platform to share helpful resources and tips on how to learn CPR. It is also an effective way to engage the community in conversations about the importance of CPR education.

In this study, Google searches with different search terms and Twitter activity were examined to see how internet users responded to Hamlin's cardiac arrest in the field. In addition, we examined the concerns of internet users regarding SCD and CPR.

2. Objective

The study objective was to evaluate and analyze the change in search volume on

Google and Twitter about SCA after the game. Since the Buffalo Bills have a tremendous fan following, the research investigates how the sports industry influences public awareness of sudden cardiac arrest and the significance of using CPR.

3. Material and Methods

To gain insight into the public's reaction to Damar Hamlin's cardiac event on the internet, we gathered two categories of data from which our analysis was based. The Google Trends website (<https://google.com>, Google LLC, Mountain-view, CA, USA) displays data on the relative volume of Google searches over time for a given search term. It was used to analyze the search term popularity over time and explore similar keywords in different regions of the world, in this case the United States. Furthermore, Google Trends provides combined relative search volumes for different topics and related queries during the period of a year from March 2022 through March 2023. In this manner, a refined search string was created that excludes irrelevant searches. To determine internet activity before and after Hamlin's cardiac event, a trend line was plotted against the data collected before and after Hamlin's cardiac event. Twitter was selected over other social media platforms because it engages a wide audience with the use of likes, retweets, and reposts. We used Sprout Social (<https://sproutsocial.com/>, Sprout Social, Chicago, USA) to collect Twitter activity related to Damar Hamlin between November 2022 and March 2023. To see the absolute volume of tweets, the same key words were used. The search terms used in both searches were: "Damar Hamlin", "heart attacks", "sudden cardiac death", and "cardiopulmonary resuscitation". These keywords were used as they were broad enough for the audience to search on the Google platform.

The data was then analyzed to find out how the public reacted to the event, and whether there were any trends over time that could be attributed to it. The number of people who actively engaged with the internet posts and those who wanted to know more about them were also used to determine the general attitude of the public toward the posts. The search was restricted to the United States and was categorized under the "health" query category to limit the results.

Statistical analysis was conducted using IBM SPSS Statistics Version 26. To investigate the difference between pre-Hamlin and post-Hamlin activity scores, a paired t-test was conducted using independent samples to determine whether the mean change for the pairs was significantly different.

4. Results

As displayed in **Figure 1**, our analysis of Google Trends data showed that the search terms "Damar Hamlin", "heart attack" and "SCD" were the most popular. There was a peak of interest shortly after the event on January 2, 2023. Of these tweets, the majority (67%) were posted within the first week of the occurrence.

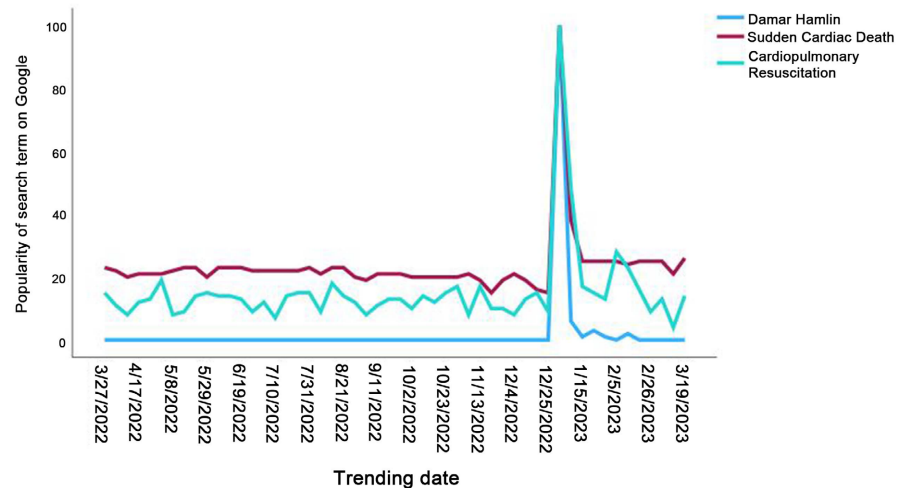


Figure 1. Google trends recorded between March 2022 and March 2023 with three keywords: “Damar Hamlin”, “Sudden Cardiac Death”, and “Cardiopulmonary Resuscitation”.

Google Trends tracks the popularity of a term over time. It takes the ratio of searches for a specific term within a given region, such as the United States, and converts it into a ratio on a range of 0 - 100, as shown in **Figure 1**.

We tracked key words on different days to assess the popularity of a term before and after the event. This was done by measuring the value of the words before and after the event. By doing this, we were able to determine whether the popularity of the term had fluctuated. We were also able to compare these values to the values of the same term at different times. This allowed us to observe any changes in popularity for the term over the selected period.

Figure 1 shows the results of the popularity of SCD search terms over time. Leveraging Google search term popularity, we gained insight into the topics people searched for the most. The results showed that the search popularity of SCD had increased significantly over the specified period. We can observe a clear trend in search processes among the public. The graph demonstrates how the search words “CPR” and “Hamlin” peak at the same time, which is a significant observation. This points to a strong correlation between the two and suggests that they are closely related. “CPR” and “Hamlin” may be somehow connected, or the same factor is driving an increase in search queries for both terms, such as the football incident, which quickly received media attention (**Figure 1**). The topic quickly gained interest and people actively sought information about it. It was clear that the public was captivated by this event and wanted to learn more.

Figure 2 provides evidence of a spike in tweets and re-tweets related to the player in question, as seen in the Twitter data. This is indicative of the widespread interest generated in the player, with many users engaging in discussion on the subject via their Twitter accounts.

Figure 3 displays how the absolute number of tweets spiked sharply, likely due to sudden cardiac death being a new concept to the public. This has sparked

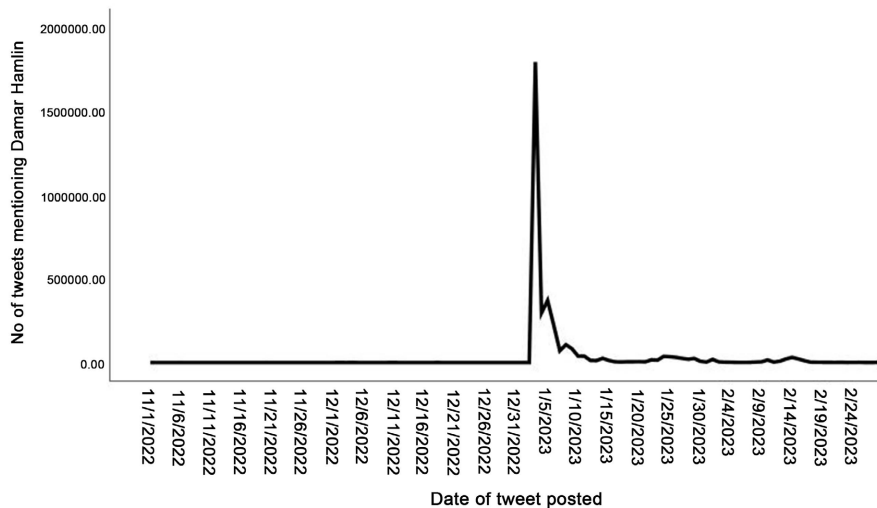


Figure 2. Twitter activity regarding the term “Damar Hamlin” in absolute numbers between Nov 2022 and March 2023.

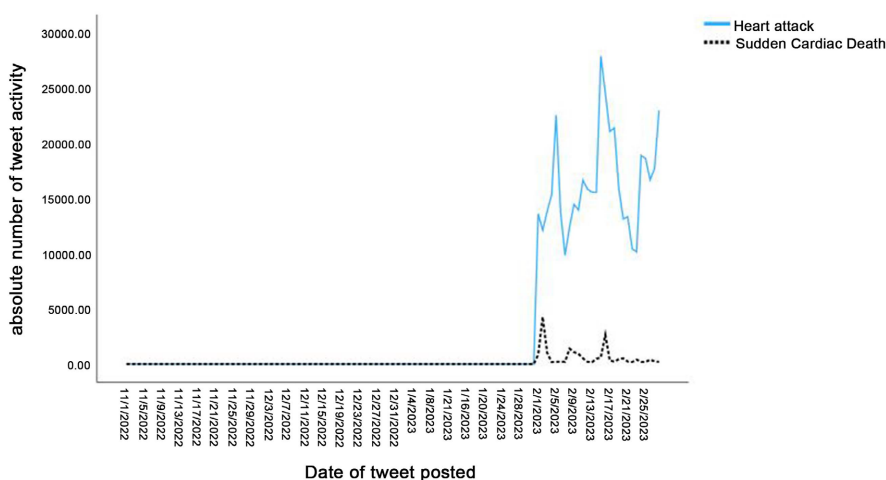


Figure 3. Twitter activity regarding the terms “heart attack” and “SCD” in absolute numbers between Nov 2022 and March 2023.

a great deal of curiosity and discussion on Twitter, as people seek to understand the implications and meaning of the term.

As displayed in **Table 1**, the SCA of esteemed NFL player, has prompted a significant surge in Google searches about the event and related topics. We conducted a paired t-test to determine whether the mean change for these pairs was significantly different from zero when paired with pre-Hamlin and post-Hamlin events. There was a statistically significant difference between the combined Google word search of “Damar Hamlin” and “SCD” ($M = -28898.88$, $SE = 1537.66$; $t = 1.62$, $p < 0.05$, $df = 119$), as displayed in pair 2 comparisons.

The incident had a significant impact on Google activity, as evidenced by the results. There was a marked difference in the before and after data, with a clear indication that the incident had an effect. This suggests that the incident had a tangible effect on Google activity.

Table 1. Comparison of pre-Hamlin and post-Hamlin Google searches when two words were paired.

Google search	Paired Differences				t	df	Significance	
	Mean	Std. Error	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
			Lower	Upper				
Pair 1 Damar Hamlin - Heart attack	25232.88	15537.66	-5533.23	55999.00	1.62	119	0.054	0.107
Pair 2 Damar Hamlin - SCD	-28898.84	15477.99	-59546.80	1749.12	-1.87	119	0.032	0.064
Pair 3 Damar Hamlin - CPR	-21.21	0.56	-22.34	-20.09	-37.9	51	<0.001	<0.001

The negative t-value reflects the fact that the pre-event data had a lower mean than the post-event data. This value is significant and indicates a difference between the two means. Interestingly, when the same test was done for the combined Google word searches of “Damar Hamlin” and “Heart Attack”, no statistically significant difference was observed ($p > 0.05$). The evidence suggests that the difference in the pre-event and post-event searches is specific and linked to the event, rather than being a feature of the general population’s search behavior.

When the public began to understand the importance of CPR in emergency situations, there was a noticeable surge in searches for related topics. Data analysis shows this to be statistically significant ($M = -21.21$, $SE = 0.56$; $t = -37.9$, $p < 0.001$). Searches using the terms “Damar Hamlin” and “CPR” increased significantly. This indicates that people were actively looking for information on how to save a life in such a situation. The public seemed to be genuinely concerned and interested in the issue of sudden cardiac arrest and its implications for the safety of athletes.

5. Discussion and Conclusion

The present study found that the incident involving Hamlin on the field led to a significant increase in public awareness of SCD and CPR. This increase in public awareness can be attributed to the wave of conversation around the two topics on social media and the internet. Furthermore, this can also act as a catalyst for successful social marketing campaigns that aim to further increase public awareness of SCD and CPR as explained by earlier authors [10] [11].

The public’s use of the search term “heart attack” was high, but Google searches for this term spiked throughout the year, indicating that the increase in searches was not unique to Hamlin’s incident. This could be attributed to the fact that a heart attack is a commonly discussed topic, regardless of any incident. However, SCD was a relatively new concept for many people, and our analysis of the response to this search term proved to be much more statistically significant. We found that people were much more likely to discuss and seek out information on SCD than they were for heart attack after the event, which indicates a higher lev-

el of interest in this new topic. There has been a notable increase in conversations and engagements on Twitter during the same period, indicating its popularity and ability to serve as a means of connecting people with topics of interest. In a cursory search on the Internet, we found no other event that would increase interest in CPR and heart attacks around the same time as Hamill's cardiac event. Therefore, this incident was assumed to be responsible for the increase in interest.

The combination of two search words in this study gave a more comprehensive understanding of what people are worried about when such incident occurs. This helped us understand the motivation behind why people searched Google for information about heart attacks. It may be out of curiosity regarding the player's situation or out of concern for their own health. There are likely to be a variety of reasons, but further research is needed to uncover the true underlying motivations.

Public health education has long been at the forefront of efforts to improve public understanding and action regarding CPR. However, the emergence of social media has opened new avenues for peer-to-peer communication about CPR. Gathering and analyzing information from social media and other data sources can provide valuable insight into the public's understanding and attitudes towards health education [12] [13].

By studying trends in social media conversations about CPR, we can better understand the way people think and act when faced with a medical emergency. Responding quickly and disseminating knowledge are essential for minimizing harm [14]. Following Hamlin's incident, life-saving skills and CPR knowledge have been emphasized more than ever, and we may be able to identify common misconceptions about CPR and develop strategies to correct them. This can help us tailor public health education programs to create more effective learning outcomes and health campaigns.

After Hamlin's incident, the National Football League (NFL) announced the launch of *The Smart Heart Sports Coalition*, a collaboration among the NFL, National Basketball Association, Major League Baseball, Major League Soccer, National Hockey League, National Collegiate Athletics Association, the American Heart Association, American Red Cross, Korey Stringer Institute, National Athletic Trainers' Association and Damar Hamlin's Chasing M's Foundation. This coalition adopted policies that can prevent fatal outcomes from sudden cardiac arrest among high school students by incorporating emergency action plans for high school athletic venues, AEDs at proximity and CPR and AED education for coaches. With this large-scale initiative there is promotion and reinforcement of the nationwide effort to raise awareness of and prevent fatalities from sudden cardiac arrest [15].

Public awareness of sudden cardiac arrest is imperative, and it is changing the response to cardiac arrest in the sports industry. Changes were implemented in the soccer industry after players Fabrice Muamba and Christian Eriksen suffered cardiac arrests during matches in 2012 and 2021, respectively. Since then, the

English Football Association has mandated increased cardiac screening frequency, requiring all academy players at age 16 to undergo a comprehensive health questionnaire, physical examination, electrocardiogram (ECG) and echocardiogram. This is one example of how a high-profile athlete can affect change and public awareness of life-threatening conditions [16].

Furthermore, the National Football League and its longtime partners, the American Heart Association, and the American Red Cross, recently announced a CPR education program. They are working with coaches and others involved in youth sports. In the wake of this incident, this is indeed a great initiative [17].

This study has certain limitations that must be considered when examining its findings. Firstly, the study is unable to measure the degree of public awareness of cardiac arrest that remained after the inciting incident was over. Secondly, we are unable to accurately determine if the public's interest in the condition resulted in true knowledge and understanding of it. Additionally, the Google and Twitter data may not be representative of the general population.

Lastly, Dina Demner-Fushman and others explain how consumers gather information from trusted sources and on trustworthy websites that contribute to generating public opinion [18]. Due to the popularity of Google and Twitter, we used only the data from these two major websites, as had been done by Osborne *et al.* [19]. Despite their widespread acceptance and use in the scientific community, a comparison of interest levels on two different topics may be misleading owing to the algorithm used by Google Trends to generate data. Our results may be biased due to the prevalence of other methods through which the public gathers and disseminates health-related information. Therefore, the results must be interpreted with caution.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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