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Defibrillation in the movies: a missed opportunity for public health education

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Abstract

Aim—To characterise defibrillation and cardiac arrest survival outcomes in movies.

Methods—Movies from 2003–2012 with defibrillation scenes were reviewed for patient and rescuer characteristics, scene characteristics, defibrillation characteristics, additional interventions, and cardiac arrest survival outcomes. Resuscitation actions were compared with chain of survival actions and the American Heart Association (AHA) Emergency Cardiovascular Care (ECC) 2020 Impact Goals. Cardiac arrest survival outcomes were compared with survival rates reported in the literature and targeted by the AHA ECC 2020 Impact Goals.

Results—Thirty-five scenes were identified in 32 movies. Twenty-five (71%) patients were male, and 29 (83%) rescuers were male. Intent of defibrillation was resuscitation in 29 (83%) scenes and harm in 6 (17%) scenes. Cardiac arrest was the indication for use in 23 (66%) scenes, and the heart rhythm was made known in 18 scenes (51%). When the heart rhythm was known, defibrillation was appropriately used for ventricular tachycardia or ventricular fibrillation in 5

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Conflicts of interest

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(28%) scenes and inappropriately used for asystole in 7 (39%) scenes. In 8 scenes with in-hospital cardiac arrest, 7 (88%) patients survived, compared to survival rates of 23.9% reported in the literature and 38% targeted by an AHA ECC 2020 Impact Goal. In 12 movie scenes with out-of-hospital cardiac arrest, 8 (67%) patients survived, compared to survival rates of 7.9–9.5% reported in peer-reviewed literature and 15.8% targeted by an AHA ECC 2020 Impact Goal.

Conclusion—In movies, defibrillation and cardiac arrest survival outcomes are often portrayed inaccurately, representing missed opportunities for public health education.

Keywords

Cardiopulmonary resuscitation (CPR); Automated External Defibrillator (AED); defibrillation; resuscitation quality; movies; entertainment

Introduction

Defibrillation with manual defibrillators in the health care setting and automated external defibrillators (AEDs) in public areas can decrease mortality from cardiac arrest.¹ Public knowledge of how to use AEDs is limited and prior work has demonstrated that the public has concerns about using AEDs.^{2,3} Communicating accurate messages about defibrillation could improve bystander response and save lives.

Movies impact viewers' perspectives and behaviours,^{4,5} and with an annual global box office of more than \$32 billion, have significant reach worldwide.⁶ This entertainment medium also represents an opportunity for educating the public about defibrillation.

In this study, we sought to (1) characterise defibrillation and cardiac arrest survival outcomes in movies, (2) compare resuscitation actions performed in movies with actions outlined for the public to follow in the chain of survival and targeted by the American Heart Association (AHA) Emergency Cardiovascular Care (ECC) 2020 Impact Goals, and (3) compare cardiac arrest survival outcomes in movies with survival rates reported in the literature and targeted by the AHA ECC 2020 Impact Goals.

Methods

Study design

Movies released during 2003–2012 containing 1 defibrillation scenes were identified by searching the Internet Movie Database (IMDb) (<http://www.IMDb.com>) and Google (<http://www.google.com>) with the following terms: defibrillator, defib, defibrillation, automated external defibrillator, AED, cardiac arrest, and defibrillation in movies.

Scenes were included if defibrillation was performed using a manual defibrillator, AED, or electrical wires. Scenes were excluded if a patient was not human (e.g., alien) or if a defibrillator was shown but not used.

The University of Pennsylvania Institutional Review Board exempted this study.

Movie characteristics

Movie characteristics were collected from the IMDb and The Numbers (<http://www.the-numbers.com>).

Coding and comparisons to real life and targeted goals

Utstein Style guidelines for cardiac arrest reporting were used to identify coding variables for patient and rescuer characteristics, scene characteristics, defibrillation characteristics, additional interventions, and cardiac arrest survival outcomes.⁷

Two authors (OM and BR) coded each scene and a third author adjudicated discrepancies (RM). If a movie had >1 scene, each scene was coded independently.

Resuscitation actions performed in movies were compared with actions outlined for the public to follow in the chain of survival and targeted by the AHA ECC 2020 Impact Goals.^{8,9} Cardiac arrest survival outcomes in movies were compared with survival rates reported in the literature and targeted by the AHA ECC 2020 Impact Goals.⁹

Statistical analysis

Summary statistics were calculated to describe coding variables.

Results

Movie characteristics

Thirty-five scenes were identified in 32 movies (Appendix 1).

The estimated worldwide gross for the movies ranged from \$8,243,567–\$890,875,303 (USD).^{10,11} The mean and median estimated worldwide gross were \$221,268,363 (USD) [s.d. \$268,680,653 (USD)] and \$95,989,590 (USD), respectively.

Scenes were from several movie genres (many scenes had >1 genre as categorized by the IMDb):¹⁰ 22 (63%) action/adventure, 8 (23%) comedy/romance, 8 (23%) drama, 10 (29%) horror, 22 (63%) mystery/thriller, 9 (26%) sci-fi, 4 (11%) crime, and 1 each (3%) from biography, fantasy, and musical.

Patient and rescuer characteristics

Twenty-five (71%) patients who received defibrillation were male, and 29 (83%) rescuers who performed defibrillation were male. Of the rescuers, 22 (63%) were health care providers.

Scene characteristics

Cardiac arrest took place inside a hospital in 15 (43%) scenes and outside a hospital in 20 (57%) scenes.

Defibrillation characteristics

The intent of defibrillation was resuscitation in 29 (83%) scenes and harm in 6 (17%) scenes (Table 1).

Cardiac arrest was the indication for use in 23 (66%) scenes, and the heart rhythm was made known in 18 scenes (51%). Of the scenes with a known heart rhythm, defibrillation was appropriately used for ventricular tachycardia or ventricular fibrillation in 5 (28%) scenes and inappropriately used for asystole in 7 (39%) scenes. In 2 (11%) scenes, a character stated aloud that the patient was in ventricular fibrillation, but the monitor demonstrated asystole. In 4 (22%) scenes, the patient was found to be in atrial fibrillation, AV block, normal sinus rhythm, or an unrecognizable rhythm (Table 1).

In 31 scenes in which a defibrillator was used, the device was a manual defibrillator in 27 (87%) scenes and an AED in 4 (13%) scenes (Table 1). Paddles/pads were misplaced on a patient's body in 6 (19%) of applicable scenes (Table 2).

In all 35 scenes in which defibrillation was performed, the patient's clothing was removed prior to defibrillation in 22 (63%) scenes, and the patient showed exaggerated body movements following defibrillation in 26 (74%) scenes (Table 2).

Additional interventions

Medications including adrenaline, noradrenaline (norepinephrine), serotonin, amiodarone, milrinone, sotalol, and saline were administered in 12 (34%) scenes (Table 1).

Comparison of resuscitation actions to real life and targeted goals

In 12 scenes with out of hospital cardiac arrest (OHCA), bystanders performed cardiopulmonary resuscitation (CPR) in 4 (33%) scenes (Figure 1). By comparison, bystander CPR is performed in approximately 31.4–33.3% of real-life cases of OHCA^{13,14} and the targeted AHA ECC 2020 Impact Goal is 62%.⁹

Comparison of cardiac arrest survival outcomes to real life and targeted goals

In 8 scenes with adult in-hospital cardiac arrest (IHCA), 7 (88%) patients survived, compared to survival in 23.9% of real-life cases of IHCA¹⁵ and the targeted AHA ECC 2020 Impact Goal of 38% (Figure 1).⁹

In 12 scenes with OHCA, 8 (67%) patients survived, compared to survival in 7.9–9.6% of real-life cases of OHCA^{13,14} and the targeted AHA ECC 2020 Impact Goal of 15.8% (Figure 1).⁹

Discussion

This study had three main findings. First, defibrillation was often portrayed inaccurately in movies and necessary co-interventions such as CPR were administered infrequently. Second, defibrillation was often used for an incorrect indication in movies. Third, cardiac arrest survival outcomes in movies were greatly inflated when compared with cardiac arrest survival outcomes reported in the literature.

Inaccurate portrayals of defibrillation

When used to resuscitate patients in movies, defibrillators were often used incorrectly. Rescuers misplaced paddles/pads on the patient's body and in some cases neglected to remove clothing or declare, "Clear!"

Most defibrillation scenes were from the action/adventure, mystery/thriller, or horror genres. In some cases, a defibrillator was used as a weapon and medications such as serotonin and milrinone were used improperly. These misuses represent missed opportunities for public education and could be addressed in future movies and resuscitation training materials.

Incorrect indications for defibrillation

While the general public cannot be expected to interpret heart rhythms, asystole as an indication for defibrillation in movies is problematic. The implied messages that one can defibrillate asystole, atrioventricular (AV) block, or any other rhythm, and not initiate CPR were common inaccuracies.

Inaccuracies in movies may inflate the public's perceptions of defibrillation's utility. For example, individuals observing resuscitation attempts in real life may wonder why a health care provider is not defibrillating a patient with a "flatline" rhythm or why a provider is not using a defibrillator on a stable patient with a heart attack, since the terms "heart attack" and "cardiac arrest" are often used interchangeably by the public.

Inflated cardiac arrest survival outcomes

The percentage of IHCA and OHCA survival in movies was considerably higher than the real-life percentages reported in the literature and targeted by the AHA ECC 2020 Impact Goals. This misrepresents the high mortality rates from cardiac arrest.

Similarly, survivors in movies typically did not require a period of recovery after defibrillation, and scenes often featured either full recovery or death. Such positive survival outcomes are likely due to the focus on entertainment value rather than an accurate depiction of the post-cardiac arrest state.

A previous study of the portrayal of CPR in popular television shows also found much greater survival in entertainment than in real life.¹⁶ While positive survival outcomes in movies may augment the public's understanding of defibrillation as a potential lifesaving measure, these depictions may foster perceptions that defibrillation of cardiac arrest victims is likely to lead to immediate, full recovery.

Limitations

First, movies may have been missed using our search methods. Internet databases and search engines are dynamic, and new movies may be identified with the passage of time. Second, in an effort to narrow search results, we did not include related terms (e.g., resuscitation, shock). Third, some movies were released outside of theatres, leaving the total number of viewers unknown.

Conclusion

Defibrillation represents a medical intervention where the public's understanding and willingness to act can make the difference between life and death. In movies, defibrillation and cardiac arrest survival outcomes are often portrayed inaccurately, representing missed opportunities for public health education. More accurate portrayals in movies may help educate viewers to provide emergency care and set appropriate expectations regarding cardiac arrest survival outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Resuscitation actions and cardiac arrest survival outcomes in movies, real life, and targeted goals.

This figure compares resuscitation actions and cardiac arrest survival outcomes^{9,12-15} shown in movies with those reported in the literature and targeted by the American Heart Association (AHA) Emergency Cardiovascular Care (ECC) 2020 Impact Goals. ^a Bar colors represent the following: black (movies), gray (current literature), and light gray (targeted by the AHA ECC 2020 Impact Goals).

^aThere is no AHA ECC 2020 Impact Goal for bystander AED use.

Table 1

Scene characteristics, defibrillator use, and additional interventions by patient survival outcomes

	Survived n (%)	Died n (%)
Scene characteristics^a		
Location	N = 21	N = 12
Inside hospital	9 (64%)	5 (36%)
Outside hospital	12 (63%)	7 (37%)
911 called/EMS arrival	N = 21	N = 12
Yes	7 (78%)	2 (22%)
No	14 (58%)	10 (42%)
Bystanders present	N = 21	N = 12
Yes	13 (62%)	8 (38%)
No	8 (67%)	4 (33%)
Defibrillator use^b		
Defibrillator type	N = 18	N = 11
Manual defibrillator	15 (60%)	10 (40%)
AED	3 (75%)	1 (25%)
Intent of use	N = 18	N = 11
Harm	1 (20%)	4 (80%)
Help	17 (71%)	7 (29%)
Cardiac arrest	N = 18	N = 11
Yes	17 (81%)	4 (19%)
No	1 (13%)	7 (87%)
Rhythm ^{b,c}	N = 10	N = 5
Asystole	5 (83%)	1 (17%)
Ventricular fibrillation	3 (67%)	1 (33%)
Ventricular tachycardia	1 (100%)	0 (0%)
Other	1 (25%)	3 (75%)
Number of shocks delivered	N = 18	N = 11
<2	4 (40%)	6 (60%)
2	14 (74%)	5 (26%)
Additional interventions^b		
CPR	N = 18	N = 11
Yes	6 (55%)	5 (45%)
No	12 (67%)	6 (33%)
Medications	N = 18	N = 11
Yes	9 (75%)	3 (25%)
No	9 (53%)	8 (47%)

EMS=emergency medical services

AED=automated external defibrillator

CPR=cardiopulmonary resuscitation

^aTwo scenes in which patient survival outcomes following resuscitation were unknown were excluded from analysis

^bThe following scenes were excluded from analysis: 2 scenes in which patient survival outcomes following resuscitation were unknown, and 4 scenes in which a substitute defibrillator (e.g., wires) was used

^cEight rhythms were unknown in scenes in which the patient survived, and 6 rhythms were unknown in scenes in which the patient died. In 4 “other” scenes, defibrillation was inappropriately used for atrioventricular block, atrial fibrillation, normal sinus rhythm, and an unrecognized rhythm.

Table 2

Defibrillation characteristics

	Yes n (%)	No n (%)	Unknown n (%)
Clothing removed prior to defibrillation	22 (63%)	11 (31%)	2 (6%)
Paddles or pads placed correctly prior to defibrillation ^a ,	22 (71%)	6 (19%)	3 (10%)
"Clear!" declared prior to defibrillation	17 (49%)	18 (51%)	--
Exaggerated body movement following defibrillation	26 (74%)	7 (20%)	2 (6%)

^a Four scenes in which a substitute defibrillator (e.g., wires) was used were excluded