Clinical paper

California drownin’: An observational study of drowning and survival in the television drama Baywatch compared to real-life LA County

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Abstract

Aims: To examine the epidemiology of drowning in the television drama Baywatch, and to compare the fictional survival rate with resuscitations following drowning in real-life Los Angeles County.

Methods: A retrospective observational study of all drownings, rescues and resuscitations in Baywatch (seasons 1 – 9), viewed on Amazon Prime. Comparison data describing rescues and drownings for real-life LA County from 1989 to 1999 were obtained from the online database of the United States Lifesaving Association.

Results: 198 episodes were viewed. 650 water rescues were identified, including 209 drownings. Of these 203 (97.12\%) survived. This was significantly lower than the survival rate achieved by the lifeguards of the real LA County over the same period ($\chi^2 = 107.41$ p < 0.001). Death following drowning in Baywatch was significantly associated with age group (p = 0.001), grade of drowning (p < 0.001), the absence of witnesses (p = 0.018), total number of lifeguards involved (p = 0.010), and the activity immediately preceding drowning (p = 0.032), particularly if this involved criminal enterprise. Survival on Baywatch was not associated with the presence or absence of the show’s protagonist, rescue speedboats, helicopters, the lifeguards’ hair colour, or resuscitation by an actual lifeguard.

Conclusion: The lifeguards of Baywatch underperformed compared to their real-life peers. Had they overseen the real beaches of LA County between 1989 and 1999, this might have potentially resulted in 1256 additional deaths. The reduced survival rate appeared to be related to the high levels of criminality in the area, and the lifeguards’ poor CPR technique.

Keywords: Drowning, Epidemiology, Outcomes

Introduction

Drowning is a significant cause of morbidity and mortality worldwide, accounting for up to 295,000 deaths annually.\textsuperscript{1} It is a major cause of accidental death in the United States, particularly in populous regions with extensive coastlines such as California.\textsuperscript{2} Drowning is defined by the World Health Organisation as “the process of experiencing respiratory impairment following submersion or immersion in liquid”.\textsuperscript{3} Recognised risk factors for drowning include male sex, age under 14 years, alcohol and drug use, inadequate supervision, and risk-taking behaviours.\textsuperscript{1,4}

Baywatch is an American drama series portraying the personal and professional lives of a group of improbably attractive Los Angeles lifeguards. It first aired in 1989 and broadcast for nine seasons in its original format. It entered the Guinness Book of Records as the most watched television show in the world. At its peak it was broadcast in 148 countries to 1.1 billion viewers,\textsuperscript{5} yet despite this popularity it was critically panned for its outlandish plots and raunchy reputation. It was also the longest-running television show never to win an Emmy
The lifeguards became famous for their crime-fighting abilities, complex interpersonal relationships, and their melodramatic ocean rescues—usually portrayed in equally dramatic slow-motion. (Fig. 1) Amazon Prime’s re-release of the original seasons of Baywatch, remastered in High Definition and 16:9 cinematic ratio, provides a valuable opportunity to investigate the epidemiology of drowning in fictional LA County. It also allows examination of the pre-hospital resuscitation practices of these world-famous lifeguards.

Methods

The author watched every episode of Baywatch (seasons 1–9) on Amazon Prime. All water rescues and drownings were identified. “Water rescue” was defined as an attempt by an LA County lifeguard (on or off-duty) to attend to a person in distress in water. “Drowning” was defined as evidence of respiratory impairment following submersion or immersion, and graded according to a specially-modified Szpilman classification (see Table 1). Exclusion criteria included drownings that occurred during flashbacks or dream sequences, animal rescues, and rescues that didn’t occur in LA County. Pre-hospital and outcome data were collected in accordance with the Uniform Reporting of Data from Drowning [“The Utstein Style”]. Additional data were also collected: the first responder’s hair colour and sex; the use of rescue helicopters or speedboats; the presence or absence of specific lifeguards; the total number of lifeguards in attendance; and the preceding activity culminating in drowning. Victims were categorised as either “Child” (appearing under 18 years old), “Adult” or “Older Adult” (appearing over 60 years old). Each drowning was subsequently reviewed at least once to ensure completeness of data collection. Statistical analyses were performed using Microsoft Excel® v16.16.2, or one of several free online statistics calculators. Fisher’s Exact test was used to compare survivors and non-survivors; a p value <0.05 was considered significant. Data describing real-life rescues and drownings are collated annually by the United States Lifesaving Association. Their online database was searched to provide comparison data for LA County for 1989–1999. Chi-squared analysis was used to compare the real-life data with Baywatch.

Results

Drownings on Baywatch

Data collection occurred over 8 weeks in January and February 2020. 198 episodes were viewed in total (9 seasons featuring 22 episodes each). 650 water rescues were identified. 209 water rescues met the study definition of drowning; of these 203 (97.12%) survived. The main findings are summarised in Table 2.

Risk factors

The risk of death following drowning in Baywatch was significantly associated with age group (children having a lower risk, p=0.001), the grade of drowning (p<0.001), the absence of witnesses (p=0.016), the total number of lifeguards in attendance (more rescuers associated with higher risk, p=0.010), and the type of activity that preceded drowning (p=0.032). Crime-fighting occupied a large proportion of lifeguard time, constituting a major plotline in 38 episodes and a minor subplot in numerous others. Compared to other activities, criminality was associated with a significantly increased risk of death following drowning (OR 10.94, 95% confidence interval 2.04 –58.4). There was significant association between survival and neurological status [categorised according to the AVPU scale] at the scene (p<0.001).

Cardiac arrests

46 drowning-related cardiac arrests underwent resuscitation; the overall survival rate was 91.3%. Ten patients had a shockable rhythm and received at least one defibrillation; of these nine (90%) survived.

Table 1 – A modified Szpilman classification to categorise drownings in Baywatch.

| Grade | Szpilman classification                                   | Modified classification                           |
|-------|-----------------------------------------------------------|-------------------------------------------------|
| 1     | Cough with normal lung auscultation                       | Coughing following submersion or immersion       |
| 2     | Rales in some lung fields                                | (n/a – unable to differentiate via television)   |
| 3     | Acute pulmonary oedema, no shock / hypotension           | (n/a – unable to differentiate via television)   |
| 4     | Acute pulmonary oedema with shock / hypotension          | Reduced consciousness, but no cardio/resp arrest|
| 5     | Respiratory arrest                                        | Respiratory arrest                               |
| 6     | Cardiorespiratory arrest                                  | Cardiorespiratory arrest                         |
Table 2 – Patients characteristics; features of drowning and resuscitation in Baywatch.

| Variable                              | Survivors n=203 (97.1%) | Non-survivors n=6 (2.9%) | P value |
|---------------------------------------|-------------------------|--------------------------|---------|
| Sex                                   |                         |                          | 0.310   |
| Male                                  | 122 (60.0%)             | 5 (83.3%)                |         |
| Female                                | 81 (39.9%)              | 1 (16.7%)                |         |
| Age                                   |                         |                          | 0.001*  |
| Child                                 | 46 (22.7%)              | 0 (0.0%)                 |         |
| Adult                                 | 152 (74.9%)             | 4 (66.7%)                |         |
| Older adult                           | 5 (2.5%)                | 2 (33.3%)                |         |
| Modified Szpilman Grade<sup>a</sup>   |                         |                          | <0.001* |
| 1                                     | 105 (51.7%)             | 0 (0.0%)                 |         |
| 4                                     | 20 (9.9%)               | 0 (0.0%)                 |         |
| 5                                     | 36 (17.7%)              | 0 (0.0%)                 |         |
| 6                                     | 42 (20.7%)              | 6 (100%)                 |         |
| Type of incident                      |                         |                          | 0.183   |
| Immersion                             | 61 (30.0%)              | 0 (0.0%)                 |         |
| Submersion                            | 142 (70.0%)             | 6 (100%)                 |         |
| Witnesses to incident                 |                         |                          | 0.016*  |
| Yes                                   | 165 (81.3%)             | 2 (33.3%)                |         |
| No                                    | 38 (18.7%)              | 4 (66.7%)                |         |
| Preceding activity                    |                         |                          | 0.032*  |
| Leisure                               | 137 (67.5%)             | 2 (33.3%)                |         |
| Criminal enterprise                   | 17 (8.4%)               | 3 (50.0%)                |         |
| Occupational                          | 28 (13.8%)              | 0 (0.0%)                 |         |
| Transport                             | 3 (1.5%)                | 0 (0.0%)                 |         |
| Other                                 | 18 (8.9%)               | 1 (16.7%)                |         |
| Lifeguards present                    |                         |                          | 0.869   |
| Mitch Buchannon                       | 71 (35.0%)              | 3 (50.0%)                |         |
| CJ Parker                             | 13 (6.4%)               | 0 (0.0%)                 |         |
| Michael Newman                        | 25 (12.3%)              | 1 (16.7%)                |         |
| Total no. rescuers                    |                         |                          | 0.010*  |
| 1                                     | 100 (49.3%)             | 2 (33.3%)                |         |
| 2                                     | 64 (31.6%)              | 2 (33.3%)                |         |
| 3                                     | 28 (13.8%)              | 0 (0.0%)                 |         |
| 4                                     | 9 (4.4%)                | 0 (0.0%)                 |         |
| 5+                                    | 2 (1.0%)                | 2 (33.3%)                |         |
| First responding lifeguard            |                         |                          | 0.833   |
| Male                                  | 138 (68.0%)             | 4 (66.7%)                |         |
| Female                                | 65 (32.0%)              | 2 (33.3%)                |         |
| First responding lifeguard            |                         |                          | 0.492   |
| Blonde                                | 41 (20.2%)              | 2 (33.3%)                |         |
| Brunette                              | 161 (79.3%)             | 4 (66.7%)                |         |
| Other                                 | 1 (0.5%)                | 0 (0.0%)                 |         |
| Helicopter used                       |                         |                          | 0.672   |
| Yes                                   | 14 (6.9%)               | 0 (0.0%)                 |         |
| No                                    | 189 (93.1%)             | 6 (100%)                 |         |
| Speedboat used                        |                         |                          | 0.270   |
| Yes                                   | 55 (27.1%)              | 3 (50.0%)                |         |
| No                                    | 148 (72.9%)             | 3 (50.0%)                |         |
| Intervention provided                 |                         |                          | 0.051   |
| None                                  | 124 (61.1%)             | 2 (33.3%)                |         |
| Mouth-to-mouth                        | 37 (18.2%)              | 0 (0.0%)                 |         |
| M-I-M, CPR                            | 35 (17.2%)              | 3 (50.0%)                |         |
| M-I-M, CPR, defibrillation            | 7 (3.4%)                | 1 (16.7%)                |         |
| Best neurological status              |                         |                          | <0.001* |
| Alert                                 | 145 (71.4%)             | 0 (0.0%)                 |         |
| Voice                                 | 5 (2.5%)                | 0 (0.0%)                 |         |
| Pain<sup>b</sup>                      | 22 (10.8%)              | 0 (0.0%)                 |         |
| Unresponsive                          | 31 (15.3%)              | 6 (100%)                 |         |

<sup>*</sup>Significant result.

<sup>a</sup> Grade 1, coughing or choking following submersion or immersion; Grade 4, unconscious but breathing; Grade 5, respiratory arrest; Grade 6, cardiac arrest.

<sup>b</sup> Coughing whilst remaining unconscious used as a surrogate for ‘Pain’ response.
The remaining 36 patients had either non-shockable rhythms or return of circulation before a defibrillator was used. Of these 33 (91.7%) survived. There were 36 respiratory arrests; 100% of these received mouth-to-mouth ventilation, and all of them survived.

**Los Angeles County 1989–1999**

In the real LA County between 1989 and 1999, there were 45,873 water rescues requiring "major medical aid" (a composite of non-fatal drownings, CPR, or defibrillator use). There were 61 deaths, indicating a pre-hospital survival rate of 99.87%. This is significantly higher than the on-scene achieved by the Baywatch lifeguards ($\chi^2 = 107.42$, $p < 0.0001$).

**Discussion**

This study provides epidemiological insight into the world’s most famous team of lifeguards. Resuscitation on Baywatch was associated with a significantly lower on-scene survival rate than in real life during the same period. The absolute mortality difference was small (2.74%), but suggests that if the Baywatch lifeguards had been patrolling the real beaches of LA County between 1989 and 1999 this may have resulted in 1256 additional deaths.

Comparison between Baywatch’s survivors and non-survivors reveals important insights. There was a significant association between age group and survival. It is notable there were no paediatric deaths, despite children under 14 years accounting for approximately one third of drowning deaths in real life.11 (This is probably a result of Baywatch’s pre-watershed transmission, although that clearly didn’t stop the show’s overt and often gratuitous sexualisation.) Criminal activity appeared rife around the Baywatch beaches, and included murders, assaults, robberies, fraud, smuggling, and piracy. This excessive criminality appeared to have two effects on drowning survival rates. Firstly, death following drowning was significantly more likely if criminal activity was involved. Secondly, much of the lifeguards’ time was preoccupied by investigating or policing the local crimewave. (This avocation eventually led to a hugely unsuccessful spin-off detective show, Baywatch Nights). There are no comparable data for crime-fighting by real-life LA County lifeguards, but even so I suggest it would be hard to beat the Baywatch team’s remarkable crime resolution rate. Every individual criminal, organisation or enterprise encountered was successfully apprehended, thwarted or dispatched with varying displays of skill, luck, athleticism and panache. This could suggest an unintended collateral benefit of their apparent deficiencies at resuscitation.

The frequent criminal distractions may explain the universally poor CPR provided by the lifeguards. Of the 46 cardiac arrests identified, only one resuscitation incorporated the 15:2 compression-to-ventilation ratio recommended at the time;12 the remaining resuscitations all delivered a 5:1 ratio. All resuscitations featured a combination of inadequate compression rates, bent elbows, a peculiar (and unpublished) ‘head-bobbing over static shoulders’ technique, or poor hand positioning. In all seriousness, televised lifeguard activity (such as the popular Australian documentary, Bondi Rescue) has previously been shown increase to beach safety knowledge and awareness;13 it is therefore a concern that the poor CPR delivered by the Baywatch lifeguards reached such a vast audience. That said, the medical literature regarding the portrayal of CPR in television fiction is inconsistent. For example, differences in outcomes can be found between US and UK dramas, with US shows tending to have more successful or optimistic portrayals.14,15 It has even been suggested that low-quality CPR (or guideline non-compliance) may actually result in more favourable outcomes;16 there may yet be some hope for the swimmers and sunbathers of fictional LA County.

The presence or absence of rescue speedboats or helicopters, the lifeguards’ hair colour, or certain specific lifeguards (namely “Mitch”, “CJ” and “Newmie”) had no significant association with survival. Each of these potential prognostic factors feature prominently in the show’s opening title-sequence and publicity material, thereby giving the impression they are key ingredients of the team’s popularity and success. Michael “Newmie” Newman’s rescues are particularly notable; he was a real-life LA County lifeguard who appeared in all nine seasons.17 He was assimilated into the cast to provide a heightened degree of realism. It is therefore disappointing to find his presence at resuscitations demonstrated no significant association with survival. Neither did resuscitation by Mitch Buchannon, the show’s protagonist and Chief Lifeguard. (He was however responsible for heroically delivering all four babies born on the show, perhaps indicating an alternative career if lifesaving or crimefighting didn’t work out.)

This study has some limitations. It is retrospective and observational, so should only be used for hypothesis generation. A theoretical risk of bias was introduced by using only one reviewer (as well as a very real risk of a single reviewer going delirious at the sight of so much bad acting, and the numerous, superfluous musical montages). I examined only the original nine seasons of Baywatch, so findings are limited to fictional LA County between 1989 and 1999. It therefore remains unknown whether the lifeguards of Baywatch: Hawaii; several made-for-TV movies, or the 2017 cinematic reboot were any more proficient in resuscitation. I was restricted to collecting pre-hospital and short-term outcome data, therefore the long-term morbidity and mortality remains unknown. Finally, I was limited to examining rescues that were televised. It is unclear how many rescues may have occurred “off-screen”, but such considerations lead to metafictional difficulties so have been ignored for the purposes of this study.

**Conclusion**

Despite their international fame, rescue and resuscitation by the lifeguards of Baywatch was associated with a significantly lower survival rate compared to their real-life peers. Had they been patrolling the real beaches of LA County between 1989 and 1999, this might have resulted in up to 1256 additional deaths. The increased mortality rate was associated with high levels of criminality in the area; it is however possible that owing to the lifeguards’ crime-fighting abilities, the fictional LA County had more effective law-enforcement as a result. Finally, resuscitation by an actual lifeguard on the show conferred no survival advantage.

**Declarations of interest**

None.

**Transparency declaration**

The author affirms that this manuscript is an honest, accurate and transparent account of the study being reported; that no important
aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

**Ethics approval**

Ethics approval was not required for this study.

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