


ORIGINAL ARTICLE

The unrealistic expectations of CPR success: a comparative public survey of Saudi Arabia and the United States

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ABSTRACT

Background: Success rates of cardiopulmonary resuscitation (CPR) in in-hospital cardiac arrest (INCA) and out-of-hospital cardiac arrest OOHCA is reported to be 15% and 3%, respectively. However, people in the general population have high and unrealistic expectations of the success of CPR outcomes. Many studies have attributed these false expectations to be due to misinformation disseminated by the mainstream television media. To this end, we have set to investigate this by performing a survey among the general public of the Kingdom of Saudi Arabia (KSA) and the general public in the United States (US).

Methods: Two cross-sectional surveys were carried out in the general populations of KSA and USA. The US data was collected via an electronic questionnaire delivered on the survey platform SurveyMonkey® and the data was analyzed for the public's expectations and the source from which the information was obtained. Statistical analysis was later done to check the impact of TV and medical dramas on the public's expectations.

Results: Out of 402 participants in KSA and 346 in the US, the subjects with accurate expectations of CPR outcomes in OOHCA and INCA settings were 11.4% and 14.7%, respectively, in KSA, and 10.7% and 12.7%, respectively in the US. Most subjects thought that CPR would be successful > 50% of the time, and a quarter of those believe that CPR is effective > 90% of the time! subgroup analysis showed no relation between TV dramas and the general public's expectations.

Conclusion: Public's expectations about CPR outcomes for INCA and OOHCA settings were largely unrealistic. Only 11.6% and 13%, respectively, had accurate prognoses and realistic expectations and were not influenced by TV medical dramas.

Keywords: Cardiopulmonary resuscitation outcomes, in-hospital cardiac arrest, out-of-hospital cardiac arrest, public expectations.

Introduction

In the 1990s and the early years of the new millennium, a new trend was emerging in televised entertainment. Writers have come to realize the story gold mine that exists in telling of the medical professional's plight, experiences, and hardships. The era of medical dramas has arrived. This was the new exciting, emotional rollercoaster that kept the audience glued to their TV sets every week. A new episode brought them a new story of emotional excitement, heroism, and ethical dilemmas. Stories of how the heroic healthcare worker, usually a physician, nurse, or paramedic, endures the heavy physical and ethical responsibilities as they deal with a dying patient and their family. Cardiopulmonary

resuscitation (CPR) has been disseminated to the general public on a wide scale.

Since the foundation of the American Heart Association (AHA) back in the 1970s, the idea that someone could

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be saved from death by CPR was never accepted or understood universally by the public until TV showed it happening on the small screen. As an unintended result of this dissemination of medical stories, it was noticed by Marco et al. [1] and a few others [2,3] that the general public started to have this unsubstantiated belief that CPR was this miraculous medical procedure to cure any cardiac arrest. As more research was conducted in this area, one study suggested that the reason was the unrealistic success of resuscitation (being 46% successful) portrayed on TV [4]. While Diem et al. [5] showed this to be up to 67%, the article commented that such outcomes were bordering on the ridiculous, as they brought false hope and misinformation to the general public.

In actuality, survival rates of CPR have been reported to vary among individual patients depending on one main parameter: the out-of-hospital cardiac arrest (OOHCA) and in-hospital cardiac arrest (INCA) [6-8]. According to the 2019 Heart and Stroke Statistics of the AHA, the percent survival rate upon discharge after CPR in the United States (US) in an OOHCA setting was about 10.5% in adults and 11.3% in children [9]. While two recent studies were done in UAE and KSA reported the survival rate to discharge to be 8% and 30%, respectively [10,11].

Most of the general public does not consider the embellishment that the writers of such entertainment programs add on top of the realistic scenarios to keep the entertainment factor optimized. As such, when they present with a loved one in a medical emergency and are faced with such a trial, they end up disappointed and dissatisfied that their physician is suggesting a "Do Not Resuscitate" directive for their patient [12,13]. In this study, we have set out to perform a comparative cross-sectional study to investigate the public's perception of the success of OOHCA and INCA in setting CPR among the general population of the KSA and the general population of the US, and to investigate the relation of this information to medical dramas, in the mainstream media.

Subjects and Methods

A comparative cross-sectional study was conducted among the general public of the Kingdom of Saudi Arabia (KSA) and the United States of America (USA). Data was collected from two identical surveys conducted in each country. Volunteers conducted the KSA survey at public venues such as parks, malls, shopping centers, and cafes on electronic tablets via the internet surveying platform SurveyMonkey®. At the same time, the US survey was collected through the SurveyMonkey® data collectors in the US through the paid service of the platform online. Data were collected on demographics, outcome expectations of OOHCA and INCA CPR, the source of the study subject's information, and the TV programs the subjects were following.

The sample size needed for this study was calculated as per these parameters: for a margin of error (the confidence interval) of 5% = 0.05, a confidence level of 95% in a population that is more than > 1,000,000, and

an unknown distribution of response set at 50% (the least skewed and maximum sample size). The sample size needed for each survey of this study is 385. Data collection was done in an electronic-based survey done on the SurveyMonkey® site. The US survey questions were formed in English. In contrast, the KSA survey questions were translated into Arabic and retranslated back into English to ensure translation equivalence by a professional notarized translator. Regarding the US data, the survey was performed by SurveyMonkey® site's electronic data collector on the investigator's behalf. This is a service provided by the site where subjects are enrolled in the study by random email dissemination by the survey site according to the inclusion/exclusion study subject criteria. Sampling was randomly done using the online website. An apriori was formulated to perform a subgroup analysis (SGA) to look for relations between different parameters such as CPR outcomes, profession, age, sex, information source, previous life support courses taken, TV dramas, etc. Data were collected and downloaded from the SurveyMonkey® site and entered into the Microsoft Access database, and the data were analyzed for frequencies and percentages using the IBM Statistical Package for the Social Sciences version 23 (IBM Corp., Armonk, NY). Descriptive, inferential, and comparative tests were the statistical tools applied. Non-contiguous data were analyzed using chi-square tests and other appropriate tests as needed. A p -value of <0.05 was used to reject the null hypothesis. The true success outcomes for OOHCA and INCA as per the previous research on the topic are 3%-5% and 2%-16%, respectively. Thus, subjects were noted to have answered the question of the expected survival rate of CPR correct as per the following definition:

OOHCA: a survival answer of $\leq 10\%$ will be considered correct, while any answer $> 10\%$ is incorrect. INCA: a survival answer of $\leq 20\%$ will be considered correct, while any answer $> 20\%$ is incorrect.

Results

In the KSA survey, 402 subjects were collected, while in the US survey, a total of 346 subjects were collected, giving a total of 748 subjects between the two surveys. The demographics of the sample taken for each survey are shown in Table 1. One major observation was that most of the subjects interviewed in the KSA survey were females with a ratio of 4:1. A sampling of the same survey was also found to favor the younger than 45 years subjects with an almost 2:1 preference. Such discrepancies in the sampled group were later analyzed concerning all parameters and questions asked. They were found to have non-significant p values, suggesting that the inequalities found in the sample surveyed did not impact the results beyond the level of random chance. The US survey, done through the electronic surveying platform in North America, showed no sampling inequalities of any kind. As was noted in previous studies, and as we have predicted when we have set out to investigate this topic, the perception and expectation of the public on the success rates of the OOHCA and the INCA are similar in magnitude of the true value of the chance of success of CPR in OOHCA and INCA.

In both countries, the percentage of subjects that answered the survey correctly with the error margin defined in the methods above is shown in Figure 1. The US subjects did a little worse than those in KSA. However, overall, more than 85% of the entire study population was wrong in their estimates of the CPR prognosis. Those that did get the answer correct in the OOHCA scenarios were at best 14.7%, while in the INCAs were only 12.7%, which goes to prove that less than 15% of the public, regardless of their country, have any idea of the true chances of success of CPR, whether inside or outside the hospital.

When asked about the chances of survival of CPR in the OOHCA or INCA scenarios, most of the people surveyed tend to answer > 50%, as shown in Table 2 and Figure 2.

Up to 9.2% in KSA think that the chances of success of CPR efforts are > 90%. The US percentage for the same bracket was almost identical at 8.7%. For the most part, answers to each survival percentage bracket in the US populous tend to be double that of what it is in KSA. Both surveys showed that subjects did believe in a higher survival rate for INCAs than OOHCA.

SGA: As it was an *a priori* in our study, to look into the different subgroups and their subsequent answers. Most of the subgroups did not show a statistically significant difference, which suggested that that parameter impacted the subjects answering the expectation questions correctly or not in either country. The only three subgroups that showed significant findings, as shown in Table 3 (found after the references), show all the subgroup analyses.

Table 1. The demographics of the sample taken for each survey.

Sex	KSA		USA		All	
	n	%	n	%	n	%
Male	78	19.4	171	49.4	249	33.3
Female	324	80.6	175	50.6	499	66.7
Age	n	%	n	%	n	%
< 45 years	283	70.3	167	48.3	450	60.2
≥ 45 years	119	29.7	179	51.7	298	39.8
Profession	n	%	n	%	n	%
Governmental	85	21.1	41	11.8	126	16.8
Professional	121	30.1	109	31.5	230	30.7
Corporate	43	10.7	41	11.8	84	11.2
Military	3	0.7	8	2.3	11	1.5
Labor	7	1.7	25	7.2	32	4.3
Private	50	12.4	41	11.8	91	12.2
Courses taken	n	%	n	%	n	%
First aid	42	10.4	53	15.3	95	12.7
Heart saver	26	6.5	31	9.0	57	7.6
None	334	83.1	262	75.7	596	79.7

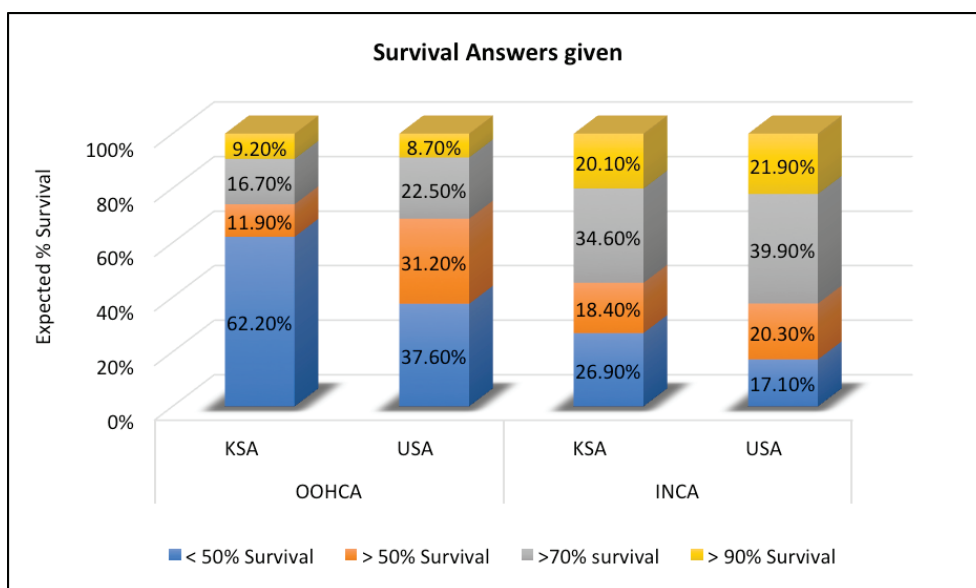


Figure 1. The percentage of subjects that answered the survey correctly with the error margin.

In the KSA survey, those who took a first aid course answered the expectation INCA question more correctly, p -value = 0.02, but not the OOHCA. While in the US survey, most of those who answered the OOHCA question correctly attributed to getting the knowledge from books. Most of those who answered both expectation questions correctly also attributed to getting the knowledge from conferences and lectures; p -values were 0.039 and 0.002, respectively. Regarding the influence of the information from TV and medical dramas on the general public, none of the subgroup analyses could identify a certain program, drama, or source that was of any statistical significance in impacting the unrealistic expectations of CPR reported in either country (Table 3).

Discussion

Our results show that the success rate expected in CPR after cardiac arrest is different between in-hospital and out-of-hospital settings, as was shown by Heller et al. [14] where INCAs were three times higher than OOHCA (12% and 39%, respectively). Our data showed that regardless of the information source, the lay public was not accurately informed about CPR outcomes. Our study has confirmed that when it comes to OOHCA, only 11% in KSA and 14.7% of the US general public believe that CPR has a poor prognosis. In KSA, the

number of subjects surveyed who believed that out-of-hospital CPR had a success rate of > 50% was 37.8%, while in the US, that percentage was almost double at 62.4% (p -value <0.0001) (Table 2). This could be due to the strong Emergency Medical Services (EMS) presence in the US, the short dispatch times, and the displays that the public see from the paramedics on the scene. For a long time, the emergency dispatcher (911) idea has been shown time and time again in the US mainstream media. In KSA, these services do exist. However, a short while ago, each emergency service had a different dispatcher and a different number. For example, the number for the EMS was 997, while Fire and rescue were 998, and for the police was 999. In the past couple of years, there was a directive to unify all emergency calls through a single operator that would then direct the call to the appropriate dispatcher. In KSA, the EMS systems are not as advanced or as elaborate as in the US. Furthermore, until recently, most of the EMS forces in major cities in KSA were staffed with Emergency Medical Technicians (EMTs) rather than fully credentialed paramedics. Thus, people may believe that CPR is more likely to succeed in the OOHCA when paramedics perform rather than EMTs. The EMS service is generally better in the US, as reported by the public in the study done by Hamam et al. [15].

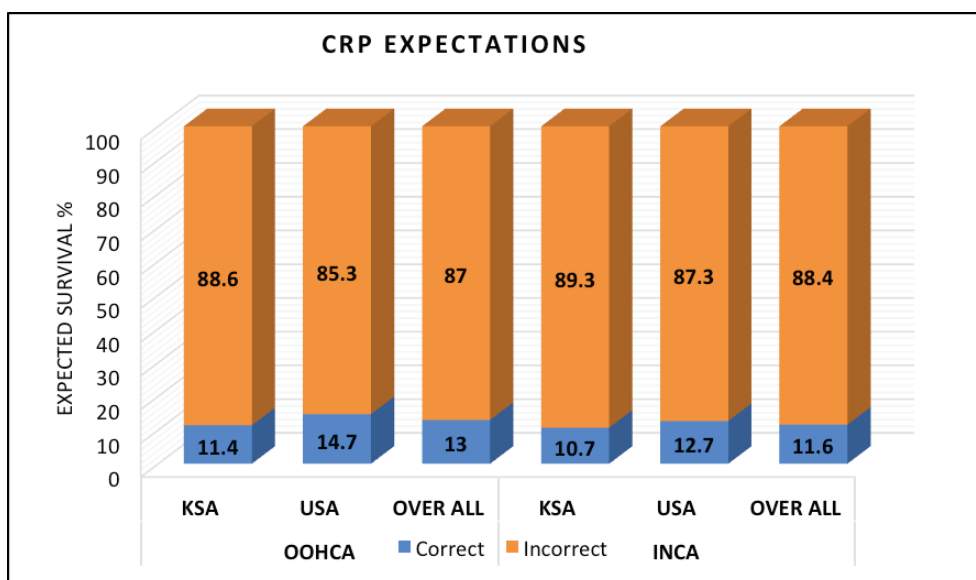


Figure 2. Chances of survival of CPR in the OOHCA or INCA scenarios.

Table 2. Chances of survival of CPR in the OOHCA or INCA scenarios.

Answer	KSA		USA		p value
	n	%	n	%	
OOHCA					
Survival > 90%	37	9.2	30	8.7	0.79
Survival > 70%	104	25.9	108	31.2	0.11
Survival > 50%	152	37.8	216	62.4	<0.0001*
INCA					
Survival > 90%	81	20.1	76	21.9	0.54
Survival > 70%	220	54.7	214	61.8	0.049*
Survival > 50%	294	73.1	287	82.9	0.0013*

*: Statistically significant (p <0.05).

Table 3. Subgroups that showing significant finding.

Country survey		KSA survey						US survey					
Setting		OOHCA			INCA			OOHCA			INCA		
Topic	Parameter	N	%	p-value	N	%	p-value	N	%	p-value	N	%	p-value
Sex	Male	8	10.26	0.714	10	12.82	0.505	27	15.79	0.586	24	14.04	0.467
	Female	38	11.73		33	10.19		24	13.71		20	11.43	
Age	Age ≤45	30	10.60	0.413	33	11.66	0.347	21	12.57	0.273	23	13.77	0.569
	Age > 45	16	13.45		10	8.40		30	16.76		21	11.73	
Profession	Governmental	11	12.94	0.632	12	14.12	0.239	8	19.51	0.321	3	7.32	0.275
	Non-governmental	35	11.08		31	9.81		40	13.70		39	13.36	
	Professional	11	9.09	0.325	9	7.44	0.159	14	12.84	0.569	14	12.84	0.929
	Non-Professional	35	12.50		34	12.14		34	15.18		28	12.50	
	Corporate	5	11.63	0.973	4	9.30	0.746	5	12.20	0.666	4	9.76	0.556
	Non-corporate	41	11.45		39	10.89		43	14.73		38	13.01	
	Military	0	0.00	0.531	0	0.00	0.546	1	12.50	0.876	1	12.50	0.922
	Non-military	46	11.56		43	10.80		47	14.46		41	12.62	
	Private	5	10.00	0.727	7	14.00	0.428	4	9.76	0.364	3	7.32	0.275
	Non-private	41	11.68		36	10.26		44	15.07		39	13.36	
	Labor	1	14.29	0.814	1	14.29	0.761	3	12.00	0.721	5	20.00	0.247
	Non-labor	45	11.42		42	10.66		45	14.61		37	12.01	
Life support course	Heart saver taken	4	15.38	0.514	4	15.38	0.427	5	16.13	0.819	5	16.13	0.550
	Heart saver not taken	42	11.17		39	10.37		46	14.60		39	12.38	
	First aid taken	8	19.05	0.102	9	21.43	0.018*	7	13.21	0.732	8	15.09	0.572
	First aid not taken	38	10.56		34	9.44		44	15.02		36	12.29	
	Course taken	12	17.65	0.078	13	19.12	0.014*	12	14.29	0.893	13	15.48	0.383
No course taken	34	10.18	30		8.98	39		14.89	31		11.83		
Source of information	Television	17	15.32	0.132	16	14.41	0.128	7	11.86	0.494	5	8.47	0.283
	All others	29	9.97		27	9.28		44	15.33		39	13.59	
	Internet medical sites	8	12.50	0.772	6	9.38	0.704	5	17.86	0.627	5	17.86	0.394
	All others	38	11.24		37	10.95		46	14.47		39	12.26	
	Internet medical sites	8	12.50	0.636	6	9.38	0.687	5	17.86	0.793	5	17.86	0.793
	Internet nonmedical sites	4	9.52		3	7.14		3	15.00		3	15.00	
	Internet non-medical sites	4	9.52	0.680	3	7.14	0.428	4	14.81	0.991	5	18.52	0.346
	All others	42	11.67		40	11.11		47	14.73		39	12.23	
	Internet over all	12	11.32	0.963	9	8.49	0.386	8	16.67	0.685	8	16.67	0.376
	All others	34	11.49		34	11.49		43	14.43		36	12.08	
	Books	1	7.69	0.666	0	0.00	0.204	7	31.82	0.020*	5	22.73	0.145
	All others	45	11.57		43	11.05		44	13.58		39	12.04	
	Conferences/Lectures	4	25.00	0.082	3	18.75	0.290	7	29.17	0.039*	8	33.33	0.002*
	All others	42	10.88		40	10.36		44	13.66		36	11.18	
Colleagues/friends	13	14.61	0.288	11	12.36	0.572	4	7.84	0.132	5	9.80	0.499	
All others	33	10.54		32	10.22		47	15.93		39	13.22		
Television medical drama being followed	Watches medical drama	14	10.29	0.605	9	6.62	0.057	24	13.48	0.497	23	12.92	0.906
	Does not watch drama	32	12.03		34	12.78		27	16.07		21	12.50	
	House MD	5	12.20	0.632	3	7.32	0.829	16	17.20	0.128	12	12.90	0.994
	All Others	9	9.47		6	6.32		8	9.41		11	12.94	
	ER	8	10.53	0.920	4	5.26	0.475	8	14.04	0.882	7	12.28	0.861
	All others	6	10.00		5	8.33		16	13.22		16	13.22	
	Greys anatomy	7	9.72	0.816	5	6.94	0.871	9	12.50	0.752	10	13.89	0.751
	All others	7	10.94		4	6.25		15	14.15		13	12.26	
	Chicago hope	0	0.00	0.734	0	0.00	0.789	1	5.00	0.238	3	15.00	0.769
	All others	14	10.37		9	6.67		23	14.56		20	12.66	
	General hospital	0	0.00	0.293	0	0.00	0.409	1	9.09	0.660	1	9.09	0.696
All others	14	11.02	9		7.09	23		13.77	22		13.17		

Country survey		KSA survey						US survey					
Setting		OOHCA			INCA			OOHCA			INCA		
Topic	Parameter	N	%	p-value	N	%	p-value	N	%	p-value	N	%	p-value
	Third watch	0	0.00	0.629	0	0.00	0.704	1	12.50	0.934	1	12.50	0.971
	All others	14	10.45		9	6.72		23	13.53		22	12.94	
	Scrubs	2	12.50	0.757	0	0.00	0.257	10	17.54	0.276	8	14.04	0.761
	All others	12	10.00		9	7.50		14	11.57		15	12.40	
	Private practice	0	0.00	0.396	0	0.00	0.505	1	5.56	0.299	2	11.11	0.809
	All others	14	10.77		9	6.92		23	14.38		21	13.13	
	Hart of dixie	2	28.57	0.102	0	0.00	0.470	0	0.00	0.176	0	0.00	0.187
	All others	12	9.30		9	6.98		24	14.37		23	13.77	
	Code black	1	16.67	0.599	0	0.00	0.505	2	10.53	0.690	3	15.79	0.693
	All others	13	10.00		9	6.92		22	13.84		20	12.58	
	Chicago med	1	33.33	0.184	0	0.00	0.641	3	9.68	0.495	4	12.90	0.997
	All others	13	9.77		9	6.77		21	14.29		19	12.93	
	Others (misc)	1	12.50	0.832	0	0.00	0.438	4	22.22	0.252	4	22.22	0.215
	Everything else	13	10.16		9	7.03		20	12.50		19	11.88	

*: Statistically significant ($p < 0.05$).

Regarding the INCA setting, subjects in both countries (73% in KSA and 82% in the US, p -value < 0.0013) believed that CPR in the hospital was successful $> 50\%$ of the time. A quarter of those believed that the success rate was actually over 90%. This unsubstantiated faith in modern medicine to bring people back from the dead can have a very hindering and detrimental effect on patient outcomes in the long run. Because if subjects in the general population believe in the high success rate of CPR, why would anyone, in their right mind, decide to declare a Do-not-resuscitate order (DNR) protocol for their loved one? The higher percentages seen in the subjects surveyed in the US may be due to a deeper-rooted belief that the US is superior in many ways, medically, to other countries. Even though our data has shown that the general public in both countries has very unrealistic expectations of the outcomes of CPR in OOHCA and INCA situations, the idea that this misinformation was obtained from or due to the portrayal of inaccurate medical acting in medical dramas, as was previously reported by Van den Bulck [16] was not shown to be true. Van den Bulck [16] reported that CPR depicted in television dramas was usually successful, thus affecting the public's judgment when confronted with real-life CPR situations. He also noted that overestimation of the success rate of CPR affected the lay public's opinions, attitudes, and behaviors. Although our data showed no connection between watching TV and the answers given to CPR expectations, we did find a trend suggesting that subjects who did NOT watch medical dramas tend to answer more correctly when asked about their CPR expectations. However, this trend did not have a significant p -value and thus could simply be due to random chance. Hence, the claim that watching medical dramas could be influencing the general public and giving them false high expectations of CPR could still be made, but our data did not show that.

The present study had few limitations; the sample size calculated and needed in the US survey was not attained. The KSA survey was done by human data collectors, while the US survey was collected through the SurveyMonkey® data collection service. Moreover,

medical dramas noted in the survey were almost exclusively of American television production. Thus, these dramas, which may be mainstream in the US may not be mainstream media in KSA, as most are offered on entertainment services such as Netflix, HBO prime, Amazon prime, etc., which are paid TV channels, and thus many the KSA public may not have access to these programs. A pay-per-view service only carried some of the programs noted in our surveys. Thus, there is no way to know if the subject surveyed did not follow the TV drama because they do not follow it or because it was not available to them. Also, all medical dramas surveyed were recorded and played in English; thus, people following such programs in KSA may or may not have the subtitled version. Thus, their understanding may not be equivalent to that of a native English speaker. The validation of the CPR expectation questions was taken from previous studies on this topic and used accordingly [12,13,16].

Conclusion

This study showed that the lay public's perception and expectations about CPR and its successful outcomes for both the INCA and OOHCA settings were inaccurate 73%-82% of the time. Only a small fraction of the general public, whether in KSA or the US, knew the real prognosis of CPR in the out-of-hospital and the in-hospital setting. As previous studies suggested, this misinformation that the public has does not seem to come from the Internet, conferences, or medical dramas. It is most likely due to the lack of awareness and ill-education that the general public has in most medical matters. This can only be remedied by better education.

List of Abbreviations

AHA	American Heart Association
CPR	Cardiopulmonary resuscitation
INCA	In-hospital cardiac arrest
KSA	Kingdom of Saudi Arabia
OOHCA	Out-of-hospital cardiac arrest
SGA	Subgroup analysis

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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None.

Consent to participate

Written informed consent was obtained from all the participants. IRB J-1016-74 date 27/4/2016

Ethical approval

Considering the study design formal IRB approval was considered exempt.

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References

1. Marco CA, Larkin GL. Public education regarding resuscitation: effects of a multimedia intervention. *Ann Emerg Med.* 2003;42(2):256–60. <https://doi.org/10.1067/mem.2003.285>
2. Mazer MA, Cox LA, Capon JA. The public's attitude and perception concerning witnessed cardiopulmonary resuscitation. *Crit Care Med.* 2006;34(12):2925–8. <https://doi.org/10.1097/01.CCM.0000247720.99299.77>
3. Roberts D, Hirschman D, Scheltema K. Adult, and pediatric CPR: attitudes and expectations of health professionals and laypersons. *Am J Emerg Med.* 2000;18(4):465–8. <https://doi.org/10.1053/ajem.2000.7338>
4. Harris D, Willoughby H. Resuscitation on television: realistic or ridiculous? A quantitative observational analysis of the portrayal of cardiopulmonary resuscitation in television medical drama. *Resuscitation.* 2009;80(11):1275–9. <https://doi.org/10.1016/j.resuscitation.2009.07.008>
5. Diem SJ, Lantos JD, Tulskey JA. Cardiopulmonary resuscitation on television. Miracles and misinformation. *N Engl J Med.* 1996;334(24):1578–82. <https://doi.org/10.1056/NEJM199606133342406>
6. Cooper S, Janghorbani M, Cooper G. A decade of in-hospital resuscitation: outcomes and prediction of

survival? *Resuscitation.* 2006;68(2):231–7. <https://doi.org/10.1016/j.resuscitation.2005.06.012>

7. Saklayen M, Liss H, Markert R. In-hospital cardiopulmonary resuscitation. Survival in 1 hospital and literature review. *Medicine.* 1995;74(4):163–75. <https://doi.org/10.1097/00005792-199507000-00001>
8. Sayre MR, Cantrell SA, White LJ, Hiestand BC, Keseg DP, Koser S. Impact of the 2005 American Heart Association cardiopulmonary resuscitation and emergency cardiovascular care guidelines on out-of-hospital cardiac arrest survival. *Prehosp Emerg Care.* 2009;13(4):469–77. <https://doi.org/10.1080/10903120903144965>
9. Heart Disease and Stroke Statistics - 2021 update. A report from the American Heart Association. Available from: <https://www.ahajournals.org/doi/10.1161/CIR.0000000000000950>
10. Aziz F, Paulo MS, Dababneh EH, Loney T. Epidemiology of in-hospital cardiac arrest in Abu Dhabi, United Arab Emirates, 2013-2015. *Heart Asia.* 2018;10(2):e011029. <https://doi.org/10.1136/heartasia-2018-011029>
11. Kaki AM, Alghalayini KW, Alama MN, Almazroaa AA, Khathlan NAA, Sembawa H, et al. An audit of in-hospital cardiopulmonary resuscitation in a teaching hospital in Saudi Arabia: a retrospective study. *Saudi J Anaesth.* 2017;11(4):415–20. https://doi.org/10.4103/sja.SJA_255_17
12. Primack BA, Roberts T, Fine MJ, Dillman Carpentier FR, Rice KR, Barnato AE. E.R. vs. E.D.: a comparison of televised and real-life emergency medicine. *J Emerg Med.* 2012;43(6):1160–6. <https://doi.org/10.1016/j.jemermed.2011.11.002>
13. Jones GK, Brewer KL, Garrison HG. Public expectations of survival following cardiopulmonary resuscitation. *Acad Emerg Med.* 2000;7(1):48–53. <https://doi.org/10.1111/j.1553-2712.2000.tb01891.x>
14. Heller RF, Steele PL, Fisher JD, Alexander HM, Dobson AJ. Success of cardiopulmonary resuscitation after heart attack in hospital and outside hospital. *BMJ.* 1995;311(7016):1332–6. <https://doi.org/10.1136/bmj.311.7016.1332>
15. Hamam AF, Bagis MH, AlJohani K, Tashkandi AH. Public awareness of the EMS system in Western Saudi Arabia: identifying the weakest link. *Int J Emerg Med.* 2015;8:35. <https://doi.org/10.1186/s12245-015-0070-7>
16. Van den Bulck JJ. The impact of television fiction on public expectations of survival following in-hospital cardiopulmonary resuscitation by medical professionals. *Eur J Emerg Med.* 2002;9(4):325–9. <https://doi.org/10.1097/00063110-200212000-00006>