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When should cardiopulmonary resuscitation be stopped: Opinions of the emergency medicine physicians in Turkey

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ABSTRACT

We aimed to define point of view of the Emergency Medicine Physicians (EMPs) working in emergency services in Turkey about the duration of cardiopulmonary resuscitation (CPR) and to determine whether a standardization could be developed for CPR duration in the light of this information. After approval of the ethics committee, a survey form was prepared using Google Document and internet access address was sent to 1.404 EMPs via mail. A total of 428 persons responded the survey and 426 appropriate responses were assessed. Of the EMPs, 64.2% suggested that the persons who perform and/or manage CPR must make the decision for the duration. The participants stated that CPR time should be longer at younger ages and shorten with aging and that duration of CPR must be shorter in patients with the end-stage. The decision for 'Do Not Attempt Resuscitation (DNAR)' can not be made in our country. Legal studies must be conducted for law, regulations and notification in order to made decision for DNAR only in terminal stage patients. Therefore there must not be a law, regulation or CPR guide including exact duration for CPR.

1. Introduction

Objective of resuscitation is to save the life, improve the deteriorating health, relieve pain, reduce disability and while achieving these goals respect decisions, rights and privacy of the individual. The decisions about initiation and termination of cardiopulmonary resuscitation (CPR) are often given in seconds by rescuers who are not familiar with the patient and don't know whether there was a previous instruction about CPR. CPR application may be contrary to the requests or interests of the individual. Health care workers, must be kept high respect for individual when life-saving CPR technic is applied at all stages (Morrison et al., 2010).

Objective of this study was to define point of view of the emergency medicine physicians (EMPs) working in emergency services in Turkey about the duration of CPR and to determine whether a standardization could be developed for CPR duration in the light of this information.

2. Methods

Approval of this study was received from the Local Ethics Committee (Date: 04/12/2012 No:126). A survey form was designed through Google Document (Google Inc. 1600. Amphitheatre Parkway. Mountain View, CA 94043. USA). In our country, a total of 1.892 EMPs are working in Emergency Medicine field with 1.041 residents, 766 specialist and assistant professors, 75 associate professors and 10 professors. Internet access address of the survey form was sent at the beginning of 01/09/2012 to 1.404 EMPs whom mail address could be obtained. In addition, the survey form was also published on Emergency Medicine Specialists mail group. At the top of the form, participants were asked to electronically approve the informed consent form and those approved the form continued to the study. The results were monitored via Google Document. The study was ended at 20/02/2013. A total of 428 persons (22.62% of the EMPs working in our country) responded the survey. Of these participants, one person who resigned, one person who was working in 112 ambulance and 2 persons who responded after end of the survey were excluded from the study. In conclusion, responses of 424 participants were assessed.

3. Results

In this study, 302 of 424 participants were male and 122 female. When ages of the participants were evaluated, 61.1% aged 34 and under while 35.6% were in 35-44 age range. Looking to the academic titles of the participants; professors were the least by 0.9% followed by associate professors 7.1%. Maximum duration of working in the ED was 3-4 years 22.9% and this was remarkably followed by 2 years and under by 22.2%. Training and Research Hospital was the most common in the hospital type 42.5% followed by University Hospital by 39.2%. Looking at the region of hospitals where the participiant work, Marmara Region was in the first place by 28.3% followed by The Central Anatolia Region 26.9% (Table 1).

Number of CPR performed in EDs within 1 month was 5 and under by 9.2%, while this number was maximum with 6-15 by 31.1%. The participants stated that they applied CPR for maximum 45 minutes (49%) followed by 30 minutes and under by 39.9%. Rate of the EMPs who apply CPR depending on the patients and diseases was found as 1.9%. Emergency Medicine Physcians stated that CPR training must be compulsory (96,7%) and the trainings must be periodically repeated (97.4%).

Answer of questions of when was the last CPR training received and how frequently should CPR training be repeated are listed in Table 2.

EMPs believed in a high rate (83.3%) that some diseases must be considered as 'Do Not Attempt Resuscitation (DNAR)' and some patients must have the right to accept themselves DNAR (75.7%). However, rate of participants who believed that statement of the patients to accept themselves DNAR would affect the duration of CPR was 62.3%, while 37.7% of the patients believed this would not affect the duration.

Answer of questions of do the patients' age and current illness status affect the duration of CPR? and should the duration of CPR be defined by laws and/or regulations? Are listed in Table 3. Considering the suggested durations for CPR according to the age ranges are listed in Table 4.

Table 1. Demographic features and occupational status of the participants

Age status of the participants		
Age	**n**	**%**
34 years and under	259	61.1
35-44 year	151	35.6
45 years and over	14	3.3
Total	424	100
Gender status of the participants		
Gender	**n**	**%**
Male	302	71.2
Female	122	28.8
Total	424	100
Academic titles of the participants		
Title	**n**	**%**
Resident	203	47.9
Specialist and Assistant Professor	187	44.1
Associate Professor	30	7.1
Professor	4	0.9
Total	424	100
Active working durations of the participants in ED		
Duration	**n**	**%**
2 years and under	94	22.2
3-4 years	97	22.9
5-6 years	67	15.8
7-10 years	88	20.7
11 years and over	78	18.4
Total	424	100
Type of the hospital in which the participants work		
Hospital Type	**n**	**%**
Research and Training Hospital	180	42.5
University Hospital	166	39.2
State Hospital	66	15.5
Private Hospital	9	2.1
Military Hospital	3	0.7
Total	424	100
Region of the Hospital in which the participants work		
Region	**n**	**%**
Marmara Region	120	28.3
Aegean Region	67	15.8
Central Anatolia Region	114	26.9
Mediterranean Region	40	9.4
Blacksea Region	34	8
Eastern Anatolia Region	30	7.1
Southeastern Anatolia Region	19	4.5
Total	424	100

Suggested minimum duration for CPR in the patients with comorbidity or malignity history varied according to being in terminal stage or compansated. In the persons having compansated comorbidity, suggested minimum duration for CPR was 30 minutes by 39.8 followed by 45 minutes by 36.6%, while in terminal stage comorbid patients this suggestion was 30 minutes by 36.9% followed by 15 minutes by 30.2%. In the patients having malignity, participants suggested minimum duration for CPR as 30 minutes (41%), while this duration was suggested as 15 minutes for the terminal stage malignity patients (32.3%). Of the participants, 0.5% suggested that CPR should not be performed in the patients having comorbidity, while this rate was 22.4% in the patients having terminal stage comorbidities. Of the participants, 4.5% suggested that CPR should not be performed in malignity patients. Whereas

Table 2. When was the last cardiopulmonary resuscitation training received and how frequently should cardiopulmonary resuscitation training be repeated

When was the last CPR training received?		
Duration	**n**	**%**
11 months and under	209	52.9
1-2 years	118	29.9
3-4 years	45	11.4
5 years and over	23	5.8
Total	395	100
How frequently should CPR training be repeated?		
Duration	**n**	**%**
Once in 6 months	70	16.9
Once a year	224	54.3
Once in 2 years	12	2.9
Once in 5 years	36	8.7
As new information is added to the literature	16	3.9
As the CPR guidelines are revised	55	13.3
Total	413	100

in the patients having terminal stage malignity history, this rate was high as 37% (Table 5).

4. Discussion

The decision about CPR is quite difficult and complicated since it often has to made in seconds by rescuers who are not familiar with the patient and don't know whether there was a previous instruction about CPR (Aybar et al., 2005). This difficult decision is mostly has to be made by EMPs. In this study, nearly half of the participants had to perform 15 or more CPR in a month, while 29.8% had to perform CPR almost everyday.

A successful CPR is definitely invaluable for the persons who received CPR and their families. Interventions made on this thin line between life and death were published as a guide for the first time by Ameracan Heart Association (AHA) in 1966. Then International Liaison Committee on Resuscitation ILCOR was found in 1993 and this committee guides the public and health care professionals about early recognition of cardiac arrest and activation, early CPR, early defibrillation and treatment through the guides which are periodically published in about each 5 years (Akıllı et al., 2012).

To the best of our knowledge, although there are a lot of laboratory studies on CPR such as matrix metalloproteinase 9 (Turkdogan et al., 2012) and oxidative stress index (Yücel et al., 2014), this survey study is the first in the published literature to investigate the opinions of the Emergency Physicians about CPR period. Of the EMPs who included in this study, 96.7% believed that CPR training must be compulsory and again 97.4% believed CPR training must be periodically repeated. In our country, CPR training is provided periodically by the hospitals giving Emergency Medicine training and by the specialty association. Residents who begin to EM specialty training are especially trained in Basic Life Support (BLS) and Advanced Cardiac Life Support (ALS). In this study, more than half (52.9%) of the participants stated that they received CPR training within last year. Again more than half (54.3%) participants suggested that CPR training should be repeated. In a study by Akıllı et al. (2012) with specialists from all the disciplines in a training and research hospital, physicians working in 112 command center and interns receiving rotation training in a university hospital; they found that only 24.6% of the participants correctly implemented the ILCOR protocols. CPR training should not be limited with EMPs, should be frequently repeated in medical education and participation to these trainings should be compulsory. We believed that by this way success of CPR would increase.

This instruction must be signed and dated to be valid. In many places, "Allow Natural Death-AND" statement replaces DNAR term. The cause of this is to allow natural course of a disease or injury and to emphasize the end of life care. DNAR instruction must be clearly described the resuscitation interventions that will be apply in life-treating emergencies. In many cases, DNAR instruction is documented as to include requests of the patients, families or proxy decision makers about the resusciation interventions. Furthermore, in some courts approval of a witness or a second treating physician is also sought (Morrison et al., 2010).

In our country, health care professionals usually take the task of guiding in decision for CPR, termination and relationships with the family during resuscitation and use the approach of "doctor knows best". This paternalist approach is seriously criticized in the developed countries and replaced by ethical approaches with participation of the patients and their families. In the North America and Western Europe law, DNAR term and related methods have been described, but in our country there is not a legal regulation as well as a consensus on the ethical aspect (Yokuşoğlu et al., 2008).

EMPs try to made decision about the duration of CPR according to the Patients' Rights Directive published in the Official Gazette in 1998 (Hasta Hakları Yönetmeliği, 1998).

In an article by Aybar et al. (2005) the authors studies arrest cases due to non-traumatic causes and concluded that CPR must performed in the patients who is believed to possibly benefit, whereas CPR would be inappropriate is the targeted results would fail to be achieved. They reported that termination of CPR gives rise to many ethical debate and is a hard decision which differs from culture to culture and that life expectancy and quality of life must be determinants. Any attempt without an addictive effect on the life expectancy or quality of life would be inappropriate and unnecessary. The previous functional capacity to be known is also important in decision of initiation and termination of CPR. CPR application is suggested to be performed in all the adult patients except for the patients having DNAR directive, irreversible death findings like rigor mortis or the patients in whom deterioration is detected in the vital findings such as septic or cardiogenic shock despite the maximal treatment and those having end-stage diseases like diffuse metastatic cancer. Except for the cases such as hypothermia and drug intoxication, it is suggested to terminate the resuscitation in patients whom spontaneous circulation could not be achieved during 30-minute CPR and ALS implementations. It was suggested to continue resuscitation for a while in the cases of drug intoxication and the condition in which the patient is hypothermic such as drowning in cold water (Aybar et al., 2005).

Health care professionals remain in dilemma about initiation and termination times of CPR during resuscitation. In this case, CPR team must make decision based on the patient's will, medical conditions, possible benefits, cost and

Table 3. Do the patients' age and current illness status affect the duration of CPR? Should the duration of CPR be defined by laws and/or regulations?

Does age of the patient affect the duration of CPR ?	**Male**		**Female**		**Total**	
Answer	**n**	**%**	**n**	**%**	**n**	**%**
Yes	250	83	91	75	341	80.4
No	52	17	31	25	83	19.6
Total	302	100	122	100	424	100
Does current illness status affect the duration of CPR ?	**Male**		**Female**		**Total**	
Answer	**n**	**%**	**n**	**%**	**n**	**%**
Yes	280	92.7	113	92.6	393	927
No	22	7.3	9	7.4	31	7.3
Total	302	100	122	100	424	100
Should the duration of be defined by laws and/or regulations?	**Male**		**Female**		**Total**	
Answer	**n**	**%**	**n**	**%**	**n**	**%**
Only minimum duration should be defined	68	22.5	38	31.1	106	25
Minimum and maximum durations should be defined	28	9.3	18	14.8	46	10.8
Should left to the persons who perform and/or manage CPR	206	68	66	54.1	272	64.2
Total	302	100	122	100	424	100

ethical principles (Rudnicka-Drożak and Aftyka, 2011). The guides describes termination time of BLS in case of out-of-hospital cardiac arrest. However, termination criteria for ALS could not be established for the in-hospital arrest cases.

Termination of Rescutitative Efforts in the Out-of-Hospital System BLS; The rescuers who initiated BLS should continue to resuscitation until one of the following events occurs:

1. Restoring of the effective spontaneous circulation
2. Handing over of the care to a team providing Advanced Life Support
3. Failure of the rescuers to continue due to endanger others
4. Existence of reliable and valid criteria regarding the occurrence of death, detection of the criteria of clear death or observation of the criteria for termination of rescutitation (Morrison et al., 2010).

Health care professionals should take into account ethical, legal and cultural factors when they care those in need for CPR. Even health care professionals have to play a role in the decision for resuscitation, they should guide this decision with science, preferences of patients themselves or their proxies, local policies and legal regulations (Akıllı et al., 2012).

Families or patients may request care which has a low chance of success. However, health care providers don't have to maintain a similar care if there is a scientific or social consensus for the treatment to fail. A medical treatment can be considered useless if it does not achieve its goal. An objective criteron for medical futileness was defined 1990 as to have a chance of survival by 1% for the interventions and medical therapy. Although this criteron is controversial, it remains a base for current futileness research. The most obvious example for an inappropriate or in effective intervention is CPR application in a patient who experienced irreversible death. In lack of the objective signs of irreversible death (e.g. cut of the head, rigor mortis or putrefaction) and in lack of a previously known directive refusing resuscitative efforts, full resuscitation must be performed. The conditions such as irreversible cerebral damage or brain death can not be assessed or predicted during cardiac arrest in a reliable way. To stop rescutiation during or after rescutiation and not to maintain the treatment sustaining life are ethically equal.

In the case of indefinitive diagnosis, a trial treatment can be initiated until obtaining more details about the survival possibility, preferences of the patient and expected clinical course (Grade IIb, LOE) (Morrison et al., 2010).

In their review, Sert et al. (2007) studied ethical approaches for performing CPR and stated that there are not DNAR implementations in our country, there is not a clear opinion on whether CPR should be performed and that the hospitals try to solve this problem by consulting to a variety of departmants. They mentioned the necessity for patients to actively participate to the decision in preparation of DNAR. They proposed that an important issue like DNAR instruction should be discussed as a versitale by physicians and lawyers and that necessary legal regulations and ethical principles should be established considering the values of our country (Sert et al., 2007).

A high rate of ERMPs included in this study believe that patients' age and current illness status affect the duration of CPR. There is a wrong belief of women are more emotional and therefore they would make decision in this emotionality and their decisions would be different from men. Whereas evaluating the responses according to the genders, we could see that both men and women have the same opinion on this issue. This indicated that all the EMPs acts with their knowledge, guides and in light of the literature and not with the emotions when perform their tasks.

Termination of Resuscitative Efforts in the In-Hospital Cardiac Arrest; the decision for termination of the resuscitative efforts belongs to the treating physician in the hospital and this decision is made considering numerous factors. This factors include the arrest being with or without witness, CPR time, first arrest rhythm, defibrillation time, comorbidities, pre-arrest condition and whether there is restore of the spontaneous circulation in a point during resuscitation. In termination of the in-hospital resuscitation, clinical decision rules may help to reduce variability in making decision, but evidence about their reliability is limited and the rules must be prospectively confirmed before they are recognized (Morrison et al., 2010).

In this study, when the responses regarding the duration of CPR according to the age ranges were examined, longer CPR durations were suggested in children and young, while

Table 4. Suggested minimum CPR durations according to the ages

Age Ranges	15 years and under		16-29 years		30-49 years		50-64 years		65-84 years		85 years and over	
CPR time	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
15 min	3	0.7	0	0	1	0.2	3	0.7	23	5.4	70	16.5
30 min	25	5.9	30	7.1	44	10.4	88	20.8	182	42.9	203	47.9
45 min	76	17.9	111	26.2	149	35.1	191	45	134	31.6	76	17.9
60 min	167	39.4	158	37.3	150	34.4	85	20	42	9.9	23	5.4
90 min	83	19.6	62	14.6	27	6.4	14	3.3	4	0.9	1	0.3
120 min	25	5.9	18	4.2	11	2.6	2	0.5	0	0	0	0
CPR must not be performed	0	0	0	0	0	0	0	0	1	0.3	14	3.3
Depends on the patient and clinic	45	10.6	45	103	42	9.9	41	9.7	38	9	37	8.7
Total	424	100	424	100	424	100	424	100	424	100	424	100

CPR time was suggested to be shorter with increase of the age and in advanced ages. In an article by Demirsoy, (1998) human cells were stated to be affected by the natural conditions over time and deteriorations to occur in the cells. Aging and death were emphasized to be inevitable since these deteriorations can not be repaired in the non-dividing cells. Naturally risk for death increases with aging. While success of CPR performed especially in advanced ages is low, CPR is successful in children and young. EMPs were aware of this situation and suggested that CPR time must be kept long as 60 minutes, while this duration was suggested as 30 minutes in the advanced ages. The duration of CPR must be kept as long as possible in the non-traumatic, young age, drowning, freezing and intoxications.

Terminal stage is the period in which death occurs within weeks to months due to acute and chronic diseases or directly from aging and the medical interventions can not prevent this. Treatment of the symptomsa is not different in the elderly than in the young. However, some modifications may be needed in our approaches because of several physiological alterations or comorbidities developing with aging (Ikizceli et al., 1999). In terminal patients, determination of etiology of the symptoms may be limited with history and physical examination and, radiology and other diagnostic evaluations may become uncomfortable in the severe patients. Expectations of the patients in this stage are relieve of the complaints especially pain, improving of quality of life, not to become a heavy burden to their families, to be with loved ones and to keep the control in hands (Karan and Akın, 2012).

In this study, in the case of comorbidity minimum CPR duration was suggested as 30 minutes with the highest rate (39.8%) followed by 45 minutes in the second place (36.6%), while in case of the terminal comorbidity again 30 minutes of minimum CPR duration was suggested with the highest rate (39.8%) followed by 15 minutes (30.2%). Rate of the participants who believed CPR should not be performed in comorbidity group was low as 0.5%, while this rate showed a great increase in terminal stage comorbidity as 22.4%. When the results were examined regarding malignity, the participants suggested min CPR duration as 30 minutes (41%) in case of malignity alone, while only 4.5% of the participants suggested CPR not to be performed. Whereas in terminal stage malignity patients, majority of the participanst (37%) suggested CPR not to be performed and 32.3% of the participants suggested min duration of CPR as 15 minutes. EMPs did not want to perform invasive procedures like CPR in terminal stage patients, because they thought that chance of success is very low and this procedure would give discomfort to the patients. We believe that, it would be the best action to take necessary measures in order the patients to experience a comfort death. However, as we mentioned before DNAR is forbidden in our country. The decision for DNAR must be made with a discussion among the physician, patient and patient's family for terminal stage patients.

It is necessary to add articles into the laws and regulations stating that the duration of CPR belongs to the person who perform and/or manage CPR and only in case of terminal stage DNAR might be accepted with the common decision by the physician, patient and patient's family.

In conclusion; EMPs have to perform CPR. EMPs must be always knowledgeable and carefully monitor the new guides knowledgable about CPR. CPR training should not be limited with EMPs, should be frequently repeated in medical education and and participation to these trainings should be compulsory. We believed that by this way success of CPR would increase.

The decision for DNAR could not be made in our country, leaving the persons who performe and/or manage CPR in dilemma. Therefore Legal studies must be conducted for law, regulations and notification in order to made decision for

Table 5. Suggested minimum CPR durations in the patients having compansated and terminal stage comorbidities and malignity history

Status of Disease	Comorbidity		Terminal Stage Comorbidity		Malignity History		Terminal Stage Malignity	
Suggested CPR Time	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
15 min	16	3.7	128	30.2	59	13.9	137	32.3
30 min	169	39.8	148	34.9	174	41	93	21.9
45 min	155	36.6	35	8.3	111	26.2	22	5.2
60 min	50	11.8	9	2.1	36	8.5	10	2.4
90 min	6	1.4	0	0	5	1.2	0	0
120 min	1	0.3	0	0	0	0	0	0
CPR must not be performed	2	0.5	95	22.4	19	4.5	157	37
Depends on the patient and clinic	25	5.9	9	2.1	20	4.7	5	1.2
Total	424	100	424	100	424	100	424	100

DNAR only in terminal stage patients.

Termination time of BLS in case of the Out-of-Hospital arrest is stated in the guidelines. However, termination criteria for ALS can not be defined. The duration of CPR is seen to be affected by age of the patients with longer durations in children and young and shorter duration by aging. There is only advisory information about the duration of CPR in the guidelines. Management of CPR based on this information would prevent futile efforts and allow useful efforts to be maintained longer.

Including definitive duration for CPR in the guideliness, laws and regulations would cause problems between the persons who perform and/or manage CPR and relatives of the patients who received resuscitation. Therefore, we believe that the duration of CPR must not be included in laws, regulations or CPR guidelines.

There is not any law or regulation about the duration of CPR in our country. Legal studies should be conducted about the decision form CPR time to be left to the person who perform and/or manage CPR.

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