

# Laypeople and basic life support\*

O LEIGO E O SUPORTE BÁSICO DE VIDA

EL LEGO Y EL SOPORTE BÁSICO DE VIDA

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## ABSTRACT

Training laypeople to give first aid in emergency situations and offer basic life support (BLS) is crucial in order to save lives and avoid sequelae. The objective was to identify laypeople's knowledge about BLS. Structured interviews were performed using non-technical language. The sample consisted of 385 subjects. Most (57.1%) were women with complete secondary-level education and incomplete higher education (53.7%). It was verified that only 9.9% know the mouth-to-mouth ventilation maneuver; 84.2% knew the chest compression technique (CCT), and 79.9% of these knew its purpose. Only 14.5% know how to position the victim to perform CCT; 82.4% reported a frequency below 60 CCT minute. Since they do not have adequate information and foundations regarding the stages of BLS, laypeople can give incorrect first aid to victims, which can harm resuscitation.

## KEY WORDS

Cardiopulmonary resuscitation.  
Heart arrest.  
Health education.  
Emergencies.

## RESUMO

A capacitação do leigo para o atendimento precoce em situações de emergência e instituição do suporte básico de vida (SBV) é fundamental para salvar vidas e prevenir seqüelas. O objetivo foi identificar o conhecimento dos leigos sobre SBV. Utilizou-se entrevista estruturada em linguagem não-técnica. A amostra compreendeu 385 sujeitos, a maioria (57,1%) do sexo feminino com ensino médio completo e superior incompleto (53,7%). Verificou-se apenas 9,9% conhecem a manobra de respiração boca-a-boca; 84,2% conhecem a técnica de compressão torácica externa (CTE), e destes, 79,9% sabem sua finalidade. Apenas 14,5% sabem posicionar a vítima para realizar a CTE; 82,4% referem uma frequência menor que 60 CTE/minuto. Por não apresentarem adequada informação e fundamentação das etapas do SBV, os leigos podem prestar atendimento incorreto à vítima de emergência, acarretando prejuízos à reanimação.

## DESCRIPTORES

Resuscitação cardiopulmonar.  
Parada cardíaca.  
Educação em saúde.  
Emergências.

## RESUMEN

La capacitación del lego para la atención precoz en situaciones de emergencia e aplicación del soporte básico de vida (SBV) es fundamental para salvar vidas y prevenir secuelas. El objetivo fue identificar el conocimiento de los legos sobre SBV. Se utilizó la entrevista estructurada en un lenguaje no técnico. La muestra comprendió 385 sujetos, la mayoría (57,1%) del sexo femenino con enseñanza media completa y superior incompleta (53,7%); Los que conocen la maniobra de respiración boca a boca son apenas 9,9%; 84,2% conocen la técnica de compresión torácica externa (CTE) y de estos, 79,9% saben su finalidad. Apenas 14,5% saben posicionar a la víctima para realizar la CTE, 82,4% refieren una frecuencia menor que 60 CTE/minuto. Por no presentar adecuada información y fundamentos de las etapas del SBV, los legos pueden prestar una atención incorrecta a la víctima de emergencia, ocasionando perjuicios en la reanimación.

## DESCRIPTORES

Resuscitación cardiopulmonar.  
Paro cardíaco.  
Educación en salud.  
Urgencias médicas.

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## INTRODUCTION

Cardiovascular disease is the major cause of deaths in Brazil and worldwide every year<sup>(1-4)</sup>. The majority of causes are a result of ischemic heart disease<sup>(5)</sup>. Lack of recognition of symptoms and overstatement of identified situations lead to 80% of deaths outside the hospital, due to delays in the assistance<sup>(6)</sup>. Therefore, the relevance of assistance during cardiac arrest (CRA) is paramount, the lack of which corresponds to tragic events that advance the end of life (sudden death)<sup>(6)</sup>.

Recently, a national study mapped a training program aimed at quality improvement, and the costs of cardiopulmonary resuscitation (CPR) for practitioners in adult intensive and semi-intensive care units<sup>(7)</sup>.

Basic life support (BLS) programs encompass phases that can begin outside the hospital environment<sup>(1,3,6-8)</sup> and can be performed by properly trained and informed laypeople, thus increasing survival and reducing sequelae of CRA victims<sup>(1,4,9)</sup>. BLS is defined as the first approach to the victim and entangles the patency of airways, ventilation, and artificial circulation<sup>(3,9)</sup>. Advance access to emergency services and assistance, as well as early defibrillation are added to these maneuvers<sup>(9)</sup>.

The simple action of a layperson that rapidly recognizes a CRA and calls for specialized help prevents myocardial and cerebral deterioration. There is evidence of mortality reduction for CRA victims that were immediately assisted by CPR performed by volunteers, showing that cardiac and cerebral functions were preserved<sup>(3)</sup>.

Besides lack of knowledge, there are other factors that hinder or delay appropriate help. The performance of mouth-to-mouth resuscitation is one of the reasons rescuers refuse to comply with BLS<sup>(3,9,11)</sup>. However, intrathoracic pressure generated by external thoracic compression (ETC) is believed to be sufficient to displace an obstructive body in the airways<sup>(9,11)</sup>. Besides, positive pressure ventilation is not crucial during the first minutes of CRA, as the spontaneous gasping process maintains partial pressures of both oxygen and carbonic gases close to normal levels<sup>(3,11-12)</sup>.

We should keep in mind that CPR's main objective is to promote an artificial circulation of oxygen throughout the body, especially the brain and heart, until the spontaneous return of all vital functions<sup>(13)</sup>.

Training laypeople about CRA is vital, providing them with information of all BLS phases, as a way to *mechanize the process*, thus preventing either a waste of time in thinking about the next step, or the *gridlock* caused by the emotions in such an urgent situation<sup>(9)</sup>.

Justification of this is evident in the direct relation between time and myocardial and cerebral function preser-

vation, in addition to reducing morbidity and mortality indexes, as well as their influence on survival and quality of life<sup>(4,6,12)</sup>.

Due to a lack of awareness and fear of social disapproval in the event of failure, initial basic maneuvers are still mishandled, despite of the existing training courses on BLS for laypeople<sup>(7)</sup>.

Thus, if CRA victims' survival depends upon how fast BLS is implemented, some questions arise: What do laypeople know about BLS? How do laypeople execute BLS maneuvers?

Taking into account the importance of such activity, the present study intended to check the knowledge level of laypeople on BLS, as well as possible failures on the implementation of maneuvers for further interventions.

## OBJECTIVE

Considering the importance of BLS, the present study intended to check the knowledge of laypeople about BLS, as well the possible failures on the implementation of maneuvers for further interventions and thus to pinpoint the knowledge of BLS by a sample lay population living in the countryside of the State of Sao Paulo.

## METHOD

This descriptive study was analyzed by the Institution's Ethics Committee on Research, and approved under the legal opinion CEP number 552/2004.

The sample consisted of subjects age 18 or older, who agreed to take part in the research performed on the streets of a city in the countryside of the State of Sao Paulo.

Sample size was based on the assessment of correct and positive answers; a pilot study was carried out in 58 individuals, and the highest score among all achieved results was taken into consideration, which reached n=385 individuals, with a 5% level of significance and 5% sample error (d=0.05). Individuals under 18 years of age, health professionals (nursing teams and doctors), and those belonging to the fire brigade were excluded. The justification for the age group resolution lies on the legality for interview authorization, and because the above-mentioned professionals are expected to be knowledgeable of the issue.

The questionnaire (Appendix I) was elaborated after the reading and analysis of the reviewed bibliography, basically approaching the BLS survival and sequence chain<sup>(4,9,11)</sup>. The Appendix was split into two parts: *identification* and *basic life support*, comprised of open and closed multiple choice questions.

There is evidence of mortality reduction for CRA victims that were immediately assisted by CPR performed by volunteers, showing that cardiac and cerebral functions were preserved.

In order to validate the instrument, seven experts and six laypeople examined the text, considering the scope, objectivity, and pertinent criteria. The experts included three doctors, three nurses, and one fire fighter; the laypeople group was comprised of two representatives of each educational degree: elementary, high school, and university. After being analyzed, the instrument was restructured according to the critiques and suggestions observed and accepted by the researchers.

Data were collected in structured interviews, after explanations and signature of the Informed Consent document (TCLE). Subjects were questioned without reading the alternatives in order to avoid interference in their answers; the answers were categorized in accordance with the established alternatives. Answers were considered correct, partially correct, incorrect, or lack of response, indicated by the alternative *I don't know*. Responses categorized as *other* corresponded to distinct answers to the established alternatives. Answers considered correct are found on the two first links of the survival chain: access and early CPR.

Fisher's exact test was used in the analysis to correlate the possibility of performing ETC without artificial ventilation and the knowledge of its objective, and the chi-square test was used in to compare the knowledge between the mouth-to-mouth respiration technique and the possibility of implementing it.

## RESULTS

In the analysis of the expert judges, the instrument was considered as wide-ranging (85.7%), objective, and pertinent (100%) for the identification. Regarding the question on basic life support, the scope and objective reached 57.1%, and pertinence reached 85.7%. Layman judges' analysis was unanimous towards positive responses concerning the three adopted criteria.

The sample included 385 interviewees averaging 35.4 (+ 14.55) years of age, the majority being females (57.1%) who attended high school (46.5%) and university degrees (34.8%). Most worked in administrative areas (19.7%), manual activities (15.6%), and commercial areas (14%).

In assessing BLS respiratory movements, 75.8% of answers were correct, 2.6% partially correct, 11.7% incorrect, and 9.9% were not able to respond.

On the performance of maneuvers to make respiration easier, 16.4% responded correctly, 50.1% incorrectly, and 33.5% were not able to respond. Only 16.4% knew that raising the victim's chin (alternative A) facilitates respiration, and 11.5% believed that lifting the victim's head could make it easier for the victim to breath (alternative B).

Laypeople's responses concerning mouth-to-mouth respiration reached 9.9% correct, 41.2% partially correct, 9.1% incorrect, and 39.5% were not able to respond. Alternative D was chosen by 39.5%, while C was elected by 21%.

The possibility of performing mouth-to-mouth respiration on an unknown person, without the use of protective equipments, obtained 42.3% affirmative and 57.7% negative answers. Justification for non-performance of mouth-to-mouth respiration are shown in Table 1 and justification for performance of the maneuver are displayed in Table 2.

**Table 1** – Laypeople's justifications for non-performance of mouth-to-mouth respiration on an unknown person, without the use of protective equipment – Campinas, SP – 2005

Justifications	N	%
Possible transmission of diseases	73	32.9
Fear or disgust	29	13.1
Unpredictable situations	06	2.7
Unknown victim	03	1.3
Prejudice	03	1.3
I don't know what to do	77	34.7
I don't know why	31	14.0
<b>Total</b>	<b>222</b>	<b>100.0</b>

**Table 2** – Laypeople's justifications for performance of mouth-to-mouth respiration on an unknown person, without the use of protective equipment – Campinas, SP – 2005

Justifications	N	%
To save	95	58.3
To help	25	15.3
On solidarity	15	9.2
Because life is important	06	3.7
I don't know why	06	3.7
I place my hands between mouths	05	3.0
By instinct or despair	04	2.4
It's faster than specialized help	03	1.8
There's no problem	03	1.8
In case there is no other first-aider around	01	0.6
<b>Total</b>	<b>163</b>	<b>100.0</b>

Over 50% of interviewees who responded incorrectly on the mouth-to-mouth respiration maneuver would perform it on unknown victims. Of those who knew the technique, 54.8% would also perform it on unknown people. Of those who said they did not know, 65% would not perform it and the 55% who responded said they would not perform it.

On the possibility of an ETC isolated performance, 47.5% of interviewees said they would not perform it, and 52.5% of them said they would. Justifications for positive and negative responses are presented in Tables 3 and 4, respectively.

**Table 3** - Justifications for the performance of isolated cardiac massage - Campinas, SP - 2005

Justifications	N	%
To save	94	46.5
To help	31	15.3
It doesn't transmit diseases	17	8.4
I'm more skilled or it's easier	09	4.5
To reanimate the victim	14	6.9
It's an alternative	09	4.5
I don't know what to do	03	1.5
I don't know why	10	4.9
Others	15	7.4
<b>Total</b>	<b>202</b>	<b>100.0</b>

**Table 4** - Justifications for the non-performance of isolated cardiac massage - Campinas, SP - 2005

Justifications	N	%
It must be associated with mouth-to-mouth respiration	32	17.5
It can bring injury to the victim	09	4.9
I don't know what to do	97	53.0
I don't know why	36	19.7
Others	09	4.9
<b>Total</b>	<b>183</b>	<b>100.0</b>

Regarding the interviewees' knowledge on what cardiac massage is and what it is for, 15.8% did not know how to answer, and 84.2% affirmed to know it. Table 5 shows the responses obtained on the ETC's objective.

**Table 5** - Laypeople's responses on the objective of cardiac massage - Campinas, SP - 2005

Justifications	N	%
Reanimation / resuscitation	96	29.6
Bring cardiac beat back	75	23.1
To stimulate the heart; to make it work again	55	17.0
To help circulation	32	9.9
To bring respiratory movements back	23	7.1
To treat cardiac problems	08	2.5
To help cardiac and pulmonary functions	06	1.8
To balance the heart beats	04	1.2
I don't know	05	1.5
Others	20	6.2
<b>Total</b>	<b>324</b>	<b>100.0</b>

Nearly 75% of interviewees who would not perform ETC are aware of its objectives; 69% of those who would perform it are also aware of its objectives. However, approximately 25% of those who would not perform it in isolation are also people who are not aware of it; 88% of those who affirmed they would perform it said they were aware of it.

On the positioning of the victim for the ETC performance, 14.5% of responses were correct; 71.7% were partially correct and 2.1% were incorrect. Among interviewees, 11.7% said they *didn't know how to do it*.

As per the region of the body in which the compression should be located, 8.8% responded correctly; 63.4% were partially correct; 18.4% were incorrect; and 9.4% said they did not know.

Regarding the amount of ETCs performed per minute, 64.7% said they did not know, and 35.3% responded affirmatively. From the collected answers, 8.1% were partially correct, and 91.9% were incorrect. No interviewee knew the number of compressions per minute, and 82.4% believed that this frequency was lower than 60.

Taking into account the total amount of seven possible corrections for the questions of the interview, 76.6% of the interviewees scored from zero to two; 22.6% from three to five; and 0.8% scored six to seven.

## DISCUSSION

CRA victim's rehabilitation success points out to the need of a skilled person to trigger CPR maneuvers as soon as cardiac arrest is identified<sup>(4,9,14)</sup>. Hence, the participation of laypeople is critical to the assistance process during the event<sup>(1,4,9)</sup>, since it can reduce time between the arrest and the onset of the interventions<sup>(1-2,4,15)</sup>.

Therefore, educating laypeople is important, in such a way to enhance survival<sup>(4)</sup>, since the early access to specialized services can be delayed by the people's inability to assess CRA and begin first-aid processes<sup>(1)</sup>. It should be noted, however, that this must be performed by skilled trainers, so that the application of the knowledge is allowed whenever necessary. Thus, informing and training population to assist CRA, and preventing first-aid *gridlocks* at the moment of making the decision on the next step to be followed, is vital<sup>(3)</sup>.

In emergency situations, assessment of and assistance to the victim must be effective actions, allowing for a better chance of survival and reduction of sequelae<sup>(3)</sup>. The victim's survival is directly related to the proper application of basic life support: CRA recognition, CPR maneuvers, and access to advanced life support<sup>(9)</sup>.

BLS phases include the recognition of the arrest, CPR maneuvers, and fast access to advanced life support<sup>(1-4,8,15)</sup>. Therefore, the immediate action of a layperson who assesses a CRA and calls for specialized help prevents myocardial and cerebral sequelae<sup>(3)</sup>.

BLS can be defined as the initial approach to the victim, performed by skilled laypeople or health professionals, encompassing the clearance of the airways, ventilation, and artificial circulation<sup>(16)</sup>. In order to evaluate respiration, the first-aid has to: SEE if there is thoracic movement; LISTEN to

victim's breath during respiration processes; and FEEL if there is air flow. To make this process happen, the first-aider must draw his ear close to the victim's mouth and nose<sup>(2-3,13,16)</sup>.

In this study, 75.8% of the sample responded correctly to the above-mentioned practice. However, 14% showed other ways of identifying whether or not the person is breathing; among them, some pointed to the need of checking the victim's pulse. This fact indicates that laypeople's knowledge about it is confused, and that can put specialized help at risk.

It is worth emphasizing that the tongue is the most common cause of airways obstruction in unconscious victims, and when there is no evidence of backbone trauma, one must lift the person's chin in order to open the airways<sup>(3,16)</sup>. However, this study revealed that a considerable portion of interviewees (33.2%) are not acquainted with this maneuver, and over 50% had incorrect responses when asked how to facilitate an unconscious person's respiration. Over 33% of respondents quoted other ways of making respiration easier, including mouth-to-mouth resuscitation, again demonstrating confusion.

Almost 40% of the sample did not know how to perform mouth-to-mouth respiration; 41.2% partially knew the technique; and less than 10% knew how to do it adequately. As per the performance of mouth-to-mouth respiration on unknown people without the use of protection equipment, 42.3% of interviewees said they would perform it; 73.6% justified it as an action that can save or help the victim. It shows that a considerable portion of the population opts for assisting unconscious people moved by solidarity impulses.

However, over 55% of interviewees would not perform artificial respiration on unknown people without protection. One of the reasons was the possibility of disease transmission (32.9%), and the lack of knowledge on how to perform the technique (34.7%).

Over 50% of interviewees who provided incorrect responses to the proper maneuver to mouth-to-mouth respiration would perform it on unknown victims, and the same percentage of those who provided correct answers would also perform it. Those who do not know how to perform it (65%), and those who partially know how to do it (55%), otherwise, would not perform it.

Although CPR is deemed as a safe, effective technique capable of saving lives, many rescuers fail in performing CPR due to fear of acquiring infectious-contagious diseases by means of mouth-to-mouth respiration<sup>(3,9,10)</sup>. In fact, several infectious diseases can be transmitted during any mouth-to-mouth contact, but in spite of the transmissibility potential, literature records very rare cases of effective contagious processes during the execution of CPR maneuvers in over 250 years<sup>(10)</sup>.

However, spontaneous gasping and ETC are capable of keeping the levels of oxygen during the first resuscitation minutes, with no meaningful alteration in survival indexes<sup>(3,9,12)</sup>. Besides, compression without ventilation makes BLS sequence simpler, facilitating learning, assimilation, and performance<sup>(11)</sup>. With no regard to the importance of artificial ventilation during the resuscitation maneuver, rescuers who would not be willing to perform it must trigger, in an immediate basis, an ETC process in the occurrence of a CPR, so that assistance is not endangered<sup>(2,8,10-12,17)</sup>.

When questioned on the possibility of performing isolated thoracic compression, almost 48% of interviewees affirmed they would not do it, and from these, 17.5% justified such an attitude by its connection with mouth-to-mouth respiration. Thus, the lay population should be informed of the possibility of performing compression without ventilation, since they associate ETC with artificial ventilation, and the non-performance of both maneuvers inhibits the implementation of any assistance measure, even among trained lay rescuers<sup>(11)</sup>.

Considering the same question, over 50% of respondents said that they would perform ETC without ventilation, and as a justification, almost 62% affirmed that it is a way of helping or saving the victim.

Over 55% of interviewees would not perform artificial respiration on unknown people without protection.

The objective of CPR is to artificially promote the circulation of oxygenated blood through the body, thus preventing injuries provoked by prolonged ischemia, until spontaneous breathing and cardiac functions return. Compression, along with the artificial ventilation, is a basic reanimation maneuver<sup>(12)</sup>. Regarding compression, most of interviewees (84.2%) were aware of its objectives and of these, almost 80% responded correctly to the question. Of those who understood the objective, almost 30% responded *resuscitation/reanimation*, while 23.1% reported that ETC functions are aimed at bringing heart beats back; 17% said that it is aimed at stimulating the heart; and 9.9% indicated that it spins the circulation.

However, knowledge on compression seems to be limited to its objective, since over 70% of respondents know how to position the victim to the performance in a partially correct way, once they only consider that the victim has to be laid in a supine position. But for an ETC to be effective, for example, the victim has to be laid in a supine position under a rigid surface<sup>(11,16)</sup>.

As per the region of the body on which compression must be applied, over 60% of interviewees provided partially correct replies and 18.4% gave incorrect replies. The appropriate location for hand positioning was indicated as being two fingers above the xiphoid process<sup>(3,12,16)</sup>. It is important to point out that this study was carried out under the guidelines from 2000<sup>(4,9)</sup>, and according to the new guidelines, the correct location is on the lower half of the sternum<sup>(17)</sup>.

The indicated frequency per minute for the performance of ETC is 100 times per minute<sup>(3,9,12,16-18)</sup>. In this research, almost 65% of respondents were not able to provide an answer to that question, and 35.3% said they were knowledgeable of the frequency. Among those who said they knew of the frequency, 92% provided an incorrect response, and 83% reported that the frequency is lower than 60/minute. None of the interviewees were able to respond correctly.

Stimulated by solidarity impulses, a meaningful portion of the population, with no adequate skill to first-aid practices, helps CRA victims, disrespecting BLS established norms, and thus put post-arrest rehabilitation at high risk. However, people still fail at the first stages of basic maneuvers due to a lack of awareness and fear of social disapproval for an eventual failure<sup>(8)</sup>.

## CONCLUSION

The results showed that the lay population has insufficient knowledge of BLS. Besides being incomplete, knowledge is sometimes incorrect, thus putting the victim at risk. Approximately 75% of respondents know how to check the

presence of respiratory movements, but over 80% do not know how to perform maneuvers that make respiration easier. Only 10% are knowledgeable of the mouth-to-mouth respiration performance technique, and 14.5% know how to position the victim for the performance of ETC, but 63.4% of respondents were partially correct on the proper body location, while none was able to report on the correct frequency per minute. Another lack of knowledge is shown regarding the performance of external thoracic compression isolated from ventilation.

Without adequate understanding and information on BLS, laypeople can incorrectly render assistance to victims, thus causing them damage. Countless rescuers are deemed to act only on a solidarity feeling, sometimes with virtually no training.

One of the limitations of this study was to carry out only a theoretical approach to the theme, leaving practical abilities aside.

Given the occurrence of emergencies outside the hospital, and the need for fast and adequate intervention, it is fundamental to train the lay population. This will likely be the objective of another study.

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### Support

*Fundação de Amparo a Pesquisa do estado de São Paulo* (State of São Paulo Research Foundation) - FAPESP

## APPENDIX I DATA COLLECTION INSTRUMENT BASIC LIFE SUPPORT

Campinas, \_\_\_ / \_\_\_ / \_\_\_      Number: \_\_\_\_\_

**I. Identification** Initials: \_\_\_\_\_ Age: \_\_\_\_\_ years

Gender: ( ) F ( ) M      Education: \_\_\_\_\_

Origin: \_\_\_\_\_ Occupation: \_\_\_\_\_

### II. Basic life support

1. How to verify if the victim is breathing?

A- ( ) looking at the chest or belly movement and/or drawing the hand or the face close to the mouth/nose of the person in order to feel air flows.

B- ( ) closing nose and check if the person reacts.

C- ( ) I don't know

2. How is it possible to facilitate the victim's respiration in case backbone damage is not under suspicion?

A- ( ) raising the victim's chin

B- ( ) raising the victim's head

C- ( ) lowering the victim's head

D- ( ) sitting the person down

E- ( ) I don't know

3. How is the mouth-to-mouth respiration performed?

A- ( ) leaning the victim's head backwards and opening his mouth. After filling the chest with air, to blow in the victim's mouth.

B- ( ) leaning the victim's head backwards, closing his nose and opening his mouth. After filling the chest with air, to blow in the victim's mouth, protecting my mouth.

C- ( ) to blow inside the person's mouth.

D- ( ) I don't know

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4. Would you perform mouth-to-mouth respiration in an unknown person, without protection equipments?

yes             no            Why? \_\_\_\_\_

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5. Would you perform a cardiac massage, even not having performed mouth-to-mouth respiration?

yes             no            Why? \_\_\_\_\_

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6. Do you know what is and what is the function of the cardiac massage?

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7. In what position must the victim be so that a cardiac massage is performed?

- A-  laid on his back, on a plan and rigid surface, with his head slightly inclined backwards.
- B-  laid on his back
- C-  in any position
- D-  he must remain in the same position after passing-out
- E-  I don't know

8. What is the appropriate body location for the performance of a cardiac massage?

- A-  two fingers before the edge of the middle-chest bone
- B-  on the heart
- C-  on the middle chest
- D-  anywhere
- E-  I don't know

9. Do you know how many times the cardiac massage should be performed, per minute, on an adult?

yes             no            How many? \_\_\_\_\_