DIFFERENCES OF FREQUENCY AND DEPTH OF BASIC LIFE SUPPORT (BLS) COMPRESSION BASED ON AMERICAN HEART ASSOCIATION (AHA) 2015 BETWEEN RULE OF FIVE AND RULE OF TEN TECHNIQUES IN SEMESTER VII AT STIKES MUHAMMADIYAH LAMONGAN LABORATORY

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Abstract
Basic life support (BLS) is an emergency measure to maintain and restore the vital organs of cardiac arrest victims and stop breathing. One of the factors influencing the success of basic life support is adequate chest compression consisting of correct frequency and depth of compression. According to AHA 2015, the exact frequency is 100 - 120 times per minute and depth between 5-6 cm. One cause of ineffectiveness of frequency and depth is the calculation technique used when performing chest compression. The purpose of this study is to know the difference of frequency and depth of chest compression between calculation technique of rule of five and rule of ten.
The research used Pre-experimental with static group compararison design approach. The population was 168 students and sample was 118 students taken using simple random sampling method. Data were analyzed by Chi Square test.
The results showed that both of the frequency and depth of chest compression with rule of five technique is more effective, than the frequency and depth of chest compression with the rule ten technique. Chi Square test result with significance 0,00 (p <0,05).
It is expected that this research will increase the students' information to understand better the implementation of basic life support
Keywords: Frequency of compression, depth of compression, BLS, Student

INTRODUCTION
Basic Life Support (BLS) is the basic competence of nurses to sustain life when sufferers experience life-threatening circumstances. According to American Heart Association (2015), in adults who become victims of heart attack, the helper needs to perform chest compression at a speed of 100 to 120 / min. While performing CPR manually, the helper should perform chest compression up to a minimum depth of 2 inches (5 cm) for the average adult by avoiding excessive chest compression depth (over 2.4 inches [6 cm]).

Basic life support (BLS) procedurs in the form of chest compression or pulmonary heart massage performed in patients with cardiac arrest or carotid artery failure result in artificial circulation by heart racking (Hidayati, 2014). In compressing the chest the heart can be made as if throbbing by pressing the chest from the outside.

The success rate of heart and pulmonary resuscitation in DKI Jakarta 60-80% was influenced by the response time which are after three minutes of successful presentation of 75%, after four minutes of presentation of 50% success and after five minutes of successful presentation to 25 (PPNI 2012) . The results of Sutono's (2015) study showed that all values of both chest compression and ventilation volume were not significantly different. The average depth of chest compression was α 0,097, Average velocity was α 0,064, and ventilation component (mean of ventilation volume) with achievement value was α 0,106. The conclusion of this research is there was no difference of compression value and RJP ventilation in achelor of Nursing in Yogyakarta.

The success of CPR is influenced by various factors including speed, depth, and nurse response time (Stillwell, 2011). The speed of chest compression is influenced by

various factors from both intrinsic and extrinsic factors. Intrinsic factor includes muscle strength affected by gender, age, and physical exercise. While the extinsic factors are influenced by the calculation technique used in performing chest compression both the rule of five and the rule of ten techniques (Nasmudin, 2015).

The compression calculation technique used by each hospital is not standardized yet. Compression calculation techniques are not included in cardiac pulmonary resuscitation procedures such as handbooks of emergency cardiovascular care for health providers, BTCLS training manuals, and Advance Trauma Life Support books. As a result of this situation, each hospital has different calculation techniques. In RSUD Dr Soetomo Surabaya is determined using the technique of counting rule of five using numbers that have 2 syllables and numbers used are 1, 2, 3, 4, 5, 6 (RSUD Dr Soetomo, 2012). While at Orthopedics Hospital of Prof. Dr. R. Soeharso Surakarta uses the rule of ten calculation technique where the numbers used are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30 (Orthopedic Hospital, 2013). In addition to the mentioned hospitals, there are still some applications of compression calculation techniques applied in emergency installations. European countries use the technique and one, and two, and three, and four. The absence of a clear standard of the most effective method in the implementation of Basic life support (BLS) leads to the differences in perception and controvertion among nurses.

Based on the description above, the researcher is interested to conduct further research. Therefore the authors conclude the title is "The difference in frequency and depth of basic life support (BLS) compression between rule of five and the rule of ten techniques to seventh semester students in laboratory of STIKES Muhammadiyah Lamongan.

RESEARCH METHODE

It is quantitative research with pre experimental research design and static group comparison design approach. Population in this research is all students of seventh semester in STIKES Muhammadiyah Lamongan as many as 168 students and it uses simple random sampling as sampling technique. The independent variable is the technique of calculating the rule of five and the rule of ten, while the dependent variable is the frequency and depth of chest compression, with a sample size of 118 students.

Instruments used in collecting data on independent variables (calculation techniques of rule of five and rule of ten) are observation sheets based on AHA 2015 and stopwatch. Respondents were recommended to do chest compression for 5 cycles, and the researchers calculated the amount of compression performed by respondents for 1 minute. Data that have been collected are then analyzed in the form of editing, coding, tabulation, and statistical test using Chi Square statistic test with significance level p 0,00 (p <0,05).

RESULT

1) **Table 1: Chest compression frequency between the rule of five and the rule of ten counting technique**

Counting technique	Chest compression frequency				Total	
	Effective		Not Effective		N	%
	$\sum$	%	$\sum$	%		
Rule Of Five	47	79,7	12	20,3	59	100
Rule of ten	19	32,2	40	67,8	59	100
Total	66	55,9	52	44,1	118	100

Based on the table, it is found that most of the respondents from total 59 respondents who use the rule of five calculation technique can give effective frequency of compression as many as 47 respondents (79.66%), and a few of them is ineffective as many as 12 respondents (20.33%). In respondents who use the technique of calculation of rule of ten can give effective frequency of compression that is 19 respondents (32.20%), and most of them are not effective that is 40 respondent (67.80%).

The results of this study can be concluded that there are differences in the frequency of chest compression between the technique of calculating the rule of five and the rule of ten. In accordance with the results of data analysis used Chi Square test there

are results X² = 26.956 and the value of sig. 2 sided (p) = 0,000 where p <0.05.

2) **Table 2: Chest compression depth between the rule of five and the rule of ten counting technique**

Counting Technique	Chest compression depth				Total	
	sufficient		Less		N	%
	∑	%	∑	%		
Rule Of Five	45	76,27	14	23,73	59	100
Rule of ten	20	33,89	39	66,11	59	100
Total	65	55,08	53	44,92	118	100

Table 2 shows that from 59 respondents, most respondents who use rule of five technique can give sufficient depth of chest compression as many as 47 respondents (76.45%) and a few of them which is not sufficient are 12 respondents (23.73%). Meanwhile, respondents using rule of ten technique most of them are 39 respondents (66.11%) give not sufficient depth compression, and few of them is not sufficient depth are as many as 20 respondents 20 respondent (33.89%)

The results of this study can be concluded that there is a difference in the depth of chest compression between the rule of five and the rule of ten techniques. In accordance with the results of data analysis using Chi Square test there are results X² = 25.586 and sig value. 2 sided (p) = 0,000 where p <0.05.

DISCUSSION
1) Chest compression frequency between the rule of five and the rule of ten counting technique

The results showed that most of the respondents follow the basic life support test at STIKES Muhammadiyah Lamongan Laboratory using the counting technique of rule of five in effective frequency chest compression that is equal to 79.66%. It means that in the application of calculating technique rule of five can provide an effective frequency of compression that is between 100-120x/minute. While the respondents using calculation technique rule of ten in frequency of compression which is mostly not effective are as many as 40 respondents (67.8%). It means that in the

application of calculation technique rule of ten can provide an ineffective compression frequency that is more than 120 metric/minute. It shows that there are differences in the frequency of chest compression between the rule of five and the rule of ten calculation techniques. In accordance with the results of data analysis using Chi Square test there are results X² = 26.956 and the value of sig. 2 sided (p) = 0,000 where p <0.05 so that H1 was accepted which means that there is difference of chest compression frequency between rule of five and rule of ten technique on student of seventh semester academic year 2016-2017 at STIKES Muhammadiyah Lamongan Laboratory.

In the application of rule of five calculation techniques, it has advantages and disadvantages. The advantages are compression frequency is more precise and more effective, and the regularity of resuscitation cycle. Those are because the first syllable is used as a compression code and the second syllable is used as a time of pause filling blood so that the stroke volume will be filled up maximum so that the successful number of cardiopulmonary resuscitation will increase by using two-syllable calculation becomes a guide when doing compression. Nevertheles, it also has disadvantage that is for beginners, they will be easy to get confused in thecalculation and they wil spend more energy to calculate (Dermawan, 2013).

Those things are influenced by several factors including knowledge, willingness to learn, and experience. In applying the technique of calculation rule of five technique, respondents are initially a little confused in the calculation because they do not understand the way of calculation, and sometimes also occur mismatch between the compression calculation done by verbal count done, but because of the willingness to learn and experience to practice, they finally understand and can apply it exactly 100-120x / minute (Behrend, 2011)

The calculation using rule of ten technique will ease the respondents to apply it because the calculation is easy so that the concentration is not directed into the technique but to the compression quality given. Nevertheles, the compression using rule of ten tends to be faster> 120x / minute,

So it does not provide a chance to recharge the blood to the left ventricle maximally that stroke volume is not filled to the maximum which can worsen the situation because it does not provide an opportunity to recoil the chest (Ganthikumar, 2016)

In this study, most of the respondents who use calculation technique of rule of ten has never practiced chest compression before the exam, so that respondents do not understand how to apply the technique which only uses one syllable. It causes the speed of irregular compression and tends to be faster since the use of one syllable in the calculation causes unclear in compressing the chest, so the respondents tend to compress more quickly.

The actual amount of chest compression given per minute is determined by the speed of chest compression and the duration of the disturbance in compression for instance to open the airway, and artificial breathing. Proper application of chest compression requires not only on adequate compression speed, but also on minimizing disruption to the resuscitation component (Purwadinanto & Sampurna, 2013).

The speed of chest compression is also influenced by various factors, both intrinsic and extrinsic. Intrinsic factor is in the form of muscle strength influenced by age, sex, physical exercise. While extrinsic factors are in the form of calculation technique used to calculate the compression of the chest. Calculation techniques affect the speed of compression of the chest due to the syllable of numbers used as a guide for starting and stopping chest compression (Nasmudin, 2015).

At the time of chest compression using rule of five calculation technique, most of the respondents do it effectively with an average of 110x / minute so that it is still in effective vulnerable 100-120x / minute. While, at the time doing chest compression of rule rule of ten, most of the Respondents perform it ineffectively with an average of 126x / min. With the appropriate calculation techniques applied when performing chest compression, it will support the survival with good neurological function because it provides an effective amount of chest compression. Incorrect speed will reduce or increase the amount of compression. Changes to 2015 AHA guidelines relate to the amount of

compression for adults 100-120 / min, while very high compression rates (greater than 120 / min) do not provide a chance for the heart to pump blood maximally.

2) Chest compression depth between rule of five and rule of ten counting technique

Result got from 59 respondents showed that more than some of respondent who use calculation technique rule of five can give enough compression depth that is 31 respondent (52,54%). In respondents who use calculation technique rule of ten which experience less compression depth are 39 respondents (66.11%). This shows that there is a difference in the depth of chest compression between rule of five and rule of ten calculation techniques. In accordance with the results of data analysis using Chi Square test, the results are $X^2 = 25.586$ and sig value. 2 sided (p) = 0,000 where p <0.05.

Administering CPR action should be performed with a high-quality CPR characteristic that includes adequate chest compression with rate and Depth. The recommended rate is in the range of 100-120 times / min and recommended Depth is in the range of 2-4 inches (5-6 cm). In addition, complete recoil at each end of compression, minimal interruptions and prevent excessive ventilation are also components in high quality CPR (Hazinski et al, 2015).

Calculation by rule of five technique using 2 syllables means the effectiveness of massage will be more effective. This is because the first syllable is used as the compression code and the second syllable is used as the time of the recharge blood rest (RSUD Dr Soetomo, 2012). In the compression, respondents should be quieter so that it can achieve the depth wanted. It is in accordance with the recommended conditions where the recharge of blood to the left ventricle can be maximal so that the stroke volume will be filled up and the effectiveness of the compression is maintained. The second reason is that when compressing using rule of five which use two syllables, the helper will have the guidance in the calculation clearly, because of the standard calculation is so constant and regular whichh is the compression with a depth of 4-6 cm. Nevertheles, with this

technique, the respondents will be easily tired since they are calculating more. So in this study, the number of respondents who do the compression with a depth of less than 4 cm is still high.

The calculation using rule of ten technique is easier for the application since the respondents do not need much power in saying, it isone syllable, (Oerman, 2010). In this study, the calculation technique rule of ten, the numbers of respondents who do the depth compression in less frequency are more than those who do it in sufficient depth. This is because respondents tend to compress faster and they do not reach the depth wanted which leads in not achieving high quality of CPR.

CONCLUSION

Based on the research, discussion and the purpose of this research, the researchers can conclude as follows:

1) Most respondents who use rule of five calculation technique can provide effective compression frequency and some are ineffective

2) A few respondents who use rule of ten calculation technique provide effective compression frequency and most are ineffective

3) There is a difference in the frequency of chest compression between rule of five and rule of ten calculation techniques.

4) More than half of respondents using rule of five calculation technique can provide sufficient depth of compression and a few of them provides less in depth

5) More than half of the respondents who use rule of ten calculation technique can provide less compression depth and a few of them provides less in depth.

6) There is a difference in the depth of chest compression between rule of five and the rule of ten calculation techniques.

SUGGESTION

Based on the results found from the limitations of the study, then it can give suggestions as follows:

1) For the Academic

The results of this study are expected to contribute in science especially in terms of the frequency and depth of basic life support (BLS) compression based on the American Heart Association (AHA) 2015

on students and as a comparison tool for the world of science in enriching information on how to handle emergency.

2) For Practitioners

For Nursing Profession, Every health worker should know the factors that affect the success of BLS compression. So, they can do BLS action properly

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