



## **The Knowledge, Attitude and Skills of Advanced Life Support among Intern Medical Officers in Eastern Province Hospitals – 2018**

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### **ABSTRACT**

Introduction: Advanced Life Support (ALS) is a set of life-saving protocols and skills that extend Basic Life Support to further support the circulation and provide an open airway and adequate ventilation (breathing) in a victim with cardiac arrest. Providing advanced life support and cardio pulmonary resuscitation in correct time and correct way is paramount important in medical emergencies. Having thorough knowledge of ALS and being familiar with ALS skills are expected from all medical personals. The intern training period plays a pivotal role in every medical personal career in gaining the knowledge and skills in advanced life support. This study is aiming to assess the knowledge, attitudes and skills in advanced life support among intern medical officers in Eastern province hospital. Objective: The main purpose of this study was to assess the knowledge, attitude and skills in advanced life support among intern medical officers in Eastern province hospitals. Methods and Materials: A cross sectional descriptive study was carried out in eastern province hospitals with intern trainee medical officers. The total population was 167 intern medical officers. A standardized self-administered questionnaire and direct observation checklist were used to collect data. IBM Statistical Package for Social Services (SPSS) version 21.0 used to analyse the data. Results: Out of 152 candidates who met the inclusion criteria 61.8% were males and 38.2% were females. The mean knowledge score of this study population was 68.71 and 16.4% of the participants had poor knowledge score. 21.1% interns declared as they are not confident in selecting and administering emergency drugs. 42.1% of interns were not sure about their ability to save a life with their current ALS knowledge. 43.6% of male and 46.6% female participants were lack in skills to handle defibrillator and give shock. 70.4% of intern medical officers who participated in the study were unable to demonstrate all the stages in ALS correctly. Conclusion: While 54.6% of interns demonstrated good knowledge scores, only 59.2% of interns were confident in selecting and administering emergency drug and 51.3% of interns were not confident in saving a life with their current ALS knowledge. Overall, only 29.6% of interns were able to demonstrate all the stages in ALS correctly.

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### **INTRODUCTION**

Medical profession has been perceived as a high ranked, pivotal and respected profession globally without any doubts. The role of a medical doctor in managing any medical condition and saving life is highly appreciated by everyone. Most of the medical emergencies become highly complicated if it leads to cardiac arrest. When a victim is suffering of cardiac arrest, Basic Life Support (BLS) and Advanced Life Support (ALS) are the important medical procedures performed in such cardiac victim in favor of save the life. BLS and ALS needs through knowledge and skills to ensure the outcome are favorable. Out of BLS and ALS, ALS needs more knowledge and skills as it is the most advanced and highly equipped procedure include selection and administration of emergency drugs also. Timely given BLS and ALS using correct techniques are paramount important in saving a life in danger. To anyone is to become a medical doctor, there are several stages to complete and obstacles to overcome. Intern training period is one of them. To a trainee medical doctor Intern training period is very important. The experience a trainee doctor gain along with the knowledge he or she gathered through intern training period is proven to play a crucial role in entire medical career of a medical doctor.

Globally, after the completion of university studies, the trainee medical doctors are allocated to the hospitals to follow their intern training period. There, they are assigned to appropriate units to get trained. In Sri Lanka, the trainee medical doctors are allocated regularly following completion of their final years in foreign or state universities. Here they are expected to be trained for one-year duration in selected disciplines such as Medicine, Surgery, Pediatric, Gynecology and obstetrics.

By definition, Cardiac arrest is a sudden, sometimes temporary cessation of the heart's function. Cardio pulmonary resuscitation is a medical procedure involving repeated cycles of compression of the chest and artificial respiration, performed to maintain blood circulation and oxygenation in a person who has suffered cardiac arrest. Cardiac arrest is one of the most common medical emergency with serious consequences. Cardio pulmonary resuscitation (CPR) is a series of actions helps to save a victim of cardiac arrest. This procedure aiming to preserve intact brain function of a cardiac arrest victim manually until appropriate measures taken to restore his or her spontaneous blood circulation and breathing. It include recognition of sign of cardiac arrest, chest compression, artificial respiration and timely defibrillation with manual or automated external defibrillator.

CPR does not “bring anyone back” who died already. But an effective CPR given in a timely manner helps to maintain oxygenated blood circulation inside the body. Maintaining the circulation delaying the tissue death and give a brief window of opportunity to resuscitate successfully without permanent brain damage.

Advanced Life Support (ALS) is a set of life-saving protocols and skills that extend Basic Life Support to further support the circulation and provide an open airway and adequate ventilation (breathing).

The knowledge and techniques relevant to CPR were developed in the 18th century according to the history. In Amsterdam, The Society for the Recovery of Drowned Persons was the first organized effort to sudden death. They claimed that the people who encountered with sudden death were saved by their recommendations. The precursors of today’s emergency medical services were the 18th century rescue societies. With time, as medical knowledge advanced, scientist and clinical researchers advocated numerous numbers of resuscitation techniques.

In 1954, James Elam with Dr. Peter Safar, experimentally demonstrated that CPR is an effective technique and superior to previous methods. Following the release of his book ‘ABC of Resuscitation’ together with Norwegian toy maker, Asmund Laedraal, created a CPR training mannequin and named it as “Resusci Anne”. Safar combined closed chest cardiac compression and mouth-to-mouth breathing. In 1956 ventricular fibrillation (VF) successfully electrically reverted using externally applied paddles.

With advancing medical knowledge, the crucial role of CPR in cardiac arrest very clearly demonstrated by several scientist and clinicians through evidence-based studies. With advancement in drug industry, several experimental studies have conducted and continue to check the effectiveness of new, already existing drugs and techniques. This resulting in replacement of old clinical practices, techniques and drugs by new techniques and drugs relevant to CPR.

Having up to date knowledge and being familiar with new techniques and practices of CPR is paramount important to ensure desirable outcome. Both general public and health care staffs must be familiar with CPR. Compare to general public, without any doubts, the responsibility of health care staffs in life threatening events is far higher. Hence being familiar with CPR and having almost completed knowledge of that is an inevitable requirement to every health care staffs. Intern medical officers are expected to have acceptable level of knowledge at the beginning of their intern training following their final exams. They are encouraged to manage the patients under the supervision of seniors and experts to gain experience and become familiar and confident in managing patients. In a hospital with intern medical officers, main units are allocated with intern officers around the clock. Hence, most of the time the intern medical officer becoming first medical authority or personal to encounter a victim of cardiac arrest prior to any seniors or specialists manage it.

Early identification of cardiac arrest and taking proper action on time has proven to improve patient’s condition. Intern medical officers are becoming immediately available professional to act on that. It is the responsibility of intern medical officers to gain the knowledge and experiences and retain it through their career. Meantime, ensuring that the intern medical officers are having competency to manage a cardiac arrest is important. The knowledge and the experiences they gain is going to be useful through their entire medical career. Hence assessing the knowledge, attitude and skills of CPR among the intern medical officers is paramount important. Intern medical officers can be competent enough or may need more training and Continues Medical Education.

### ***Study Design***

This is a cross sectional descriptive study carried out to assess the knowledge attitude and skills in advanced life support among intern medical officers in Eastern Province hospitals.

### ***Study Setting***

All Eastern province hospital with intern medical officers was the study setting.

Eastern province having nearly 128 health care institutions to fulfill the health care requirement of the province. It includes 01 Teaching hospital, 02 District general hospitals, 03 Base hospitals- Type- A, 12 Base hospitals- Type- B, 01 District hospitals- Type- A, 11 District hospitals – Type- B, 23 District hospitals- Type- C and 65 Primary medical care units.

### ***Study Period.***

Study conduction period was from 14th of September 2018 to 31st of October 2018.

### ***Study Population.***

Intern Medical Officers attached to hospitals in Eastern Province during study period were taken as the study population.

### ***Sample Size Calculation.***

As the principle investigator was able to study the total population, whole population included into study. 167 intern medical officers were studied. Sample size calculation was not done as total population included.

### ***Sampling Technique.***

Convenience sampling was the sampling technique

#### Inclusion criteria.

Intern medical officers who worked in Eastern province hospitals during the study period were included in to the study.

#### Exclusion criteria.

Intern medical officers who were on maternity, medical and other form of leave were excluded.

#### Study Instruments.

To collect the data, two questionnaires and a check list used. To assess the knowledge and attitudes two separate questionnaires used. To assess the skills the check list used. Questionnaire and check list were prepared based on the United Kingdom resuscitation council guidelines on advanced life support. Both questionnaires were having three parts. First part – Used to assess socio demographic characteristics Second part – Used to assess the knowledge of intern medical officers in advanced life support. Third part – Used to assess the attitudes of intern medical officer in advanced life support. Initially the questions adopted from the United Kingdom resuscitation council guidelines. Then according to the advices and guidance given by the experts in the field (consultant Anesthetists) some changes made to make the questionnaire more appropriate to Sri Lankan context. In addition to this some minor adjustments also made after pre- testing the questionnaire in a population similar to study group at DGH- Polannaruwa. The checklist used by American heart association to assess the skills of advanced life support used as the source to construct a check list for this study. Check list of American heart association analyzed by the experts in this field and necessary changes done to make it more appropriate to Sri Lankan context. The series of skills grouped into 06 major stages as American heart association identifies. The participant's performance in each stage recorded separately. Finally, according to the overall performance, the level of skills in advanced life support assessed.

#### Data Analysis.

Quantitative analysis: Data extracted from questionnaire was coded before starting data analysis. Accuracy of the data ensured by cross checking extracted data before entering it is into Microsoft Excel sheet and rechecked after entering. IBM Statistical Package for Social Services (SPSS) version 21.0 used to analyze the data. All these procedures done confidentially and principle investigator stored a copy of database and questionnaire confidentially.

## RESULTS

Table 1. Distribution of Socio Demographic factors.

Variables	Categories	Number and (%)
Age	<28 years	85 (55.6%)
	29-32	55 (36.2%)
	33-36	08 (5.3%)
	>36	04 (2.6%)
Gender	Male	94 (61.8%)
	Female	58 (38.2%)
University	Sri Lankan university	104 (68.4%)
	Foreign university	48 (31.6%)
Completed intern period	<06 months	75 (49.3%)
	>06 months	77 (50.7%)
Exposed to ALS training prior to intern period	Yes	144 (94.7%)
	No	08 (5.3%)

The total target population was 167. Out of this, as intern medical officers were on leave and did not give consent to participate in the study excluded, total respondents were 152 (91.01%). Total sample included 94 males (61.8%) and 38 female (38.2) intern medical officers. The age of the participated population ranged from 26 to 37 (mean age 28.97). Out of 152 intern medical officers, 104 (68.4%) intern medical officers were graduated from Sri Lankan universities and 68 (31.6%) were from foreign universities. 144 (94.7%) intern medical officers had advanced life support training prior to intern period and 08 (5.3%) student did not have

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**Table 3. Knowledge score distribution.**

Knowledge score %	Frequency	Percentage %
Good ( $\geq 70$ )	83	54.6
Average (50 -69)	44	28.9
Poor (<50)	25	16.4

16.4% of intern medical officers were demonstrating poor knowledge in advanced life support and 54.6% of intern medical officers were demonstrating good knowledge. Rest 28.9% of interns was having average knowledge (Table 4.2).

**Table 4. Distribution of knowledge scores by demographic variables.**

Demographic Variables		Knowledge score categories			P value
		Poor (<50) N (%)	Average (50-69) N (%)	Good ( $\geq 70$ ) N (%)	
Age group	<28	10 (11.8)	20 (23.5)	55 (64.7)	<0.001
	29- 32	08 (14.5)	24 (43.6)	43 (41.8)	
	33- 35	07 (87.5)	00	01 (12.5)	
	$\geq 36$	00	00	4 100	
Gender	Male	09 (9.6)	26 (27.7)	59 (62.8)	0.006
	Female	16 (27.6)	18 (31)	24 (41.4)	
Completed intern training duration	<06 months	14 (18.7)	22 (29.3)	39 (52.0)	0.728
	>06 months	11 (14.3)	22 (28.6)	44 (57.1)	

University	Sri Lankan	15 (14.4)	28 (26.9)	61 (58.7)	0.321
	Foreign	10 (20.8)	16 (33.3)	22 (45.8)	
Pre- intern ALS training exposure	Exposed	24 (16.7)	37 (25.7)	83 (57.6)	<0.001
	Not exposed.	00	07 (87.5)	01 (12.5)	

While age category less than 28 showed highest percentage of good knowledge (64.7%), strangely, the age category above 36 also showed 100% good knowledge level. Age categories 29- 32 and 33- 36 showed 41.8% and 12.5% of good level of knowledge and the differences were statistically significant. Male participant showed higher percentage of good knowledge level compare to female participant and it was statistically significant. 52.0% of interns who completed less than 06 months of training and 57.1% of interns who completed more than 06 months of training were having good knowledge level and it was not significant statistically. 58.7% of the interns from Sri Lankan universities and 45.8% of interns from foreign universities showed good knowledge level. The difference was not significant statistically. Meanwhile, 57.6% of the interns who had pre- intern ALS training program had good knowledge level and 87.5% who did not had pre- training showed average knowledge level and it was statistically significant.

**Table 5. Frequency distribution of attitude toward ALS.**

Attitude questions.	Answers	N (%)
I Feel that my internship training is adequate to equip me to handle resuscitation confidently.	Yes	88 (57.9)
	No	57 (37.5)
	Not sure	07 (4.6)
Resuscitation should be initiated by a senior Medical Officer.	Yes	17 (11.2)
	No	135 (88.8)
All junior doctors should have advance life support (ALS) course training before practices.	Yes	152 (100)
	No	00 (0.0)
ALS course should be taught during undergraduate years.	Yes	149 (98)
	No	01 (0.70)
	Not sure	02 (1.3)
Are you confident enough in selecting or giving emergency drugs?	Yes	90 (59.2)
	No	32 (21.1)
	Not sure	30 (19.7)
Did you attend pre-intern ALS training program arranged by ministry?	Yes	122 (80.3)
	No	30 (19.7)
Do you think that pre- intern ALS training program arranged by ministry of health is useful?	Yes	110 (72.4)
	No	06 (4.0)
	Not sure	36 (23.6)
Do you think that ALS course should be re- evaluated frequently?	Yes	148 (97.4)
	No	02 (1.3)
	Not sure	02 (1.3)
Do you think that you are confident enough in saving a life with your ALS knowledge?	Yes	78 (51.3)
	No	10 (6.6)
	Not sure	64 (42.1)

Of the intern medical officers, 57.9% believed that internship training was adequate to handle a patient with cardiac arrest. 98% of intern medical officers thought that the undergraduate curriculum should include advanced life support training program and almost all intern medical (100%) officers understood

that the pre- intern advanced life support program is important, and 97.4% intern officers believed that advanced life support program should be evaluated frequently. 80.3% of total intern medical officers had attended the pre- intern CPR training program held by ministry of health. 72.4% believed pre- intern CPR program is useful. Only 11.2% believed that CPR should be initiated by senior house officer. Strangely 21.1% of intern medical officers were not confident in selecting emergency drugs and 19.7% were not sure about the confident. Very importantly 42.1% of intern medical officers were not sure about whether they can save a life or not with their current ALS knowledge. 6.6% believed that they can't save a life with their current knowledge (Table 4.4).

**Table 6. Distribution of attitude toward ALS by completed intern training duration.**

Attitude questions.	Responses	Intern training duration		P Value
		<06 months N (%)	>06months N (%)	
I Feel that my internship training is adequate to equip me to handle resuscitation confidently.	Yes	35 (46.7)	53 (68.8)	0.21
	No	36 (48.0)	21 (27.3)	
	Not sure	04 (6.3)	03 (3.9)	
Resuscitation should be initiated by a senior Medical Officer.	Yes	15 (20.0)	02 (2.6)	0.001
	No	60(80.0)	75(97.4)	
All junior doctors should have advance life support (ALS) course training before practices.	Yes	75 (100)	77 (100)	
	No	00	00	
ALS course should be taught during undergraduate years.	Yes	72 (96.0)	77 (100)	0.208
	No	01 (1.3)	00	
	Not sure	02 (2.7)	00	
Are you confident enough in selecting or giving emergency drugs?	Yes	45(60.0)	45 (58.4)	0.073
	No	11(14.7)	21 (27.3)	
	Not sure	19 (25.3)	11 (14.3)	
Did you attend pre-intern ALS training program arranged by ministry?	Yes	61 (81.3)	61 (79.2)	0.744
	No	14(18.7)	16 (20.8)	
Do you think that pre- intern ALS training program arranged by ministry of health is useful?	Yes	70 (93.3)	71 (92.2)	0.004
	No	00	06 (7.8)	
	Not sure	05 (6.7)	00	
Do you think that ALS course should be re-evaluated frequently?	Yes	71 (94.7)	77 (100)	0.121
	No	02 (2.7)	00	
	Not sure	02 (2.7)	00 ()	
Do you think that you are confident enough in saving a life with your ALS knowledge?	Yes	38 (50.7)	40 (51.9)	0.784
	No	04 (5.3)	06 (7.8)	
	Not sure	33 (44.9)	31 (40.3)	

48.0% of interns who had completed <06 months of their training thought and 27.3% of interns who completed >06 months of their training thought that intern is not adequate to perform an effective resuscitation. It was statistically significant. While 20.0% of interns with <06 months thought that resuscitation should be started by senior medical officer, only 2.6% of interns with >06-months training believed the same and it was statistically significant. All the interns with <06 and >06 months training thought that intern medical officers should undergo ALS training prior to practice. And 96%

of interns with <06-months training and 100% of interns with >06-month training agreed that undergraduate curriculum should include ALS training.25.3% of interns with <06-months training and 14.3% of interns with >06-months training were not confident in selecting an administering emergency drugs. It was statistically not significant. 93.3% of interns with <06-months training and 92.2% of interns with >06-months training accepted the usefulness of pre-intern resuscitation training program. 94.7% of interns with <06-months training and 100% of interns with >06-months training accepted that ALS course should be re- evaluated frequently.445 of interns with <06-months training and 40.3% of interns with >06-months training were not confident in serving a life with their ALS knowledge and it was not significant statistically

**Table 7. Distribution of attitude toward ALS by exposure to pre- intern training.**

Attitude questions.	Responses	Prior exposure to ALS course		P Value
		Yes N (%)	No N (%)	
I Feel that my internship training is adequate to equip me to handle resuscitation confidently.	Yes	82 (56.9)	6 (75.0)	0.553
	No	55 (38.2)	02 (25.0)	
	Not sure	07 (4.9)	00	
Resuscitation should be initiated by a senior Medical Officer.	Yes	17(11.8)	00	0.302
	No	127(88.2)	08 (100)	
All junior doctors should have advance life support (ALS) course training before practices.	Yes	144(100)	08 (100)	
	No	00	00	
ALS course should be taught during undergraduate years.	Yes	141(97.9)	08 (100)	0.919
	No	01 (0.7)	00	
	Not sure	02(1.4)	00	
Are you confident enough in selecting or giving emergency drugs?	Yes	88 (61.2)	02 (25.0)	0.076
	No	28 (19.4)	04 (50.0)	
	Not sure	28 (19.4)	02(25.0)	
Did you attend pre-intern ALS training program arranged by ministry?	Yes	121(84.0)	01 (12.5)	<0.001
	No	23(16.0)	07 (87.5)	
Do you think that pre- intern ALS training program arranged by ministry of health is useful?	Yes	133(92.4)	08 (100)	0.719
	No	06(4.2)	00	
	Not sure	05 (3.4)	00	
Do you think that ALS course should be re- evaluated frequently?	Yes	140(97.2)	08(100)	0.892
	No	02(1.4)	00	
	Not sure	02 (1.4)	00	
Do you think that you are confident enough in saving a life with your ALS knowledge?	Yes	72 (50.0)	06 (75)	0.356
	No	10(6.9)	00	
	Not sure	62(43.1)	02 (25.0)	

56.9% Of interns who got exposed to ALS program prior to intern pre- intern and 75% who did not get exposed believe intern is adequate to handle a resuscitation situation. While 88.2% of interns who got exposed to ALS program thought Resuscitation should be initiated by interns, strangely 100% of intern who did not get exposed believed the same. Both interns who got exposed and did not, believed, intern medical officers should undergo ALS

training prior to practice. 97.9% of interns who got exposed to ALS program and 100% of interns who did not get exposed also accepted that undergraduate curriculum should include ALS training. 61.1% of interns who got exposed to ALS program and 25% of interns who did not were confident in selecting and administering emergency drugs. 92.4% of interns who got exposed to ALS program and 100% of interns without exposure accepted that the pre-intern program held by ministry of health is useful. While 50% of interns who got exposed to ALS program prior to intern and 75% of interns who did not get exposed were confident in saving a life with their current ALS knowledge, 43.1% and 25% of interns from both group were not sure about their ability to save a life respectively.

**Table 8. Frequency distribution of participant's skills in advanced life support.**

Advanced life support skill.	Responses		
	Correct	Incorrect	Not done
	N (%)	N (%)	N (%)
Assessment and identification of cardiac arrest	147 (96.7)	05 (3.3)	0 (0.0)
Initiate and perform effective chest compression	113 (74.3)	39 (25.7)	0 (0.0)
Give effective Rescue breath	121 (79.6)	31 (20.4)	0 (0.0)
Resume second cycle of chest compression after breath	105 (69.1)	30 (19.8)	17 (11.1)
Correct handling of defibrillator and deliver shock	68 (44.7)	84 (55.3)	0 (0.0)
Resume chest compression after shock	111 (73)	14 (9.2)	27 (17.8)

96.7% of intern medical officers assess the victim completely and identified cardiac arrest. While attempting to give CPR 25.7% of interns failed to give an effective chest compression and 20.4% failed to give effective breath. 11.1% of interns failed to resume chest compression immediately after giving breath. It is noteworthy indicating that 55.3% of intern were unable to handle defibrillators correctly and failed to deliver shock in correct way

**Table 9. Distribution of ALS skills by completed intern training period.**

Skills checked	Response	Complete training period.		P value
		< 06 months	> 06 months	
		N (%)	N (%)	
Identify and assess cardiac arrest.	Correct.	72 (96)	75 (97.4)	0.628
	Incorrect.	03 (04)	02 (2.6)	
	Not done.	0 (0.0)	0 (0.0)	
Start and perform chest compression.	Correct.	52 (69.3)	61 (79.2)	0.163
	Incorrect.	23 (30.7)	16 (20.8)	
	Not done.	0 (0.0)	0 (0.0)	
Give Rescue Breath.	Correct.	47 (62.7)	74 (96.1)	0.001
	Incorrect.	28 (37.3)	03 (3.9)	
	Not done.	0 (0.0)	0 (0.0)	
Resume chest compression Cycle- 2	Correct.	36 (48)	64 (83.1)	0.001
	Incorrect.	29 (38.7)	06 (7.8)	
	Not done.	10 (13.3)	07 (9.1)	
Handle defibrillator and give shock	Correct.	30 (40)	38 (49.4)	0.246
	Incorrect.	45 (60)	39 (50.6)	
Resume compression immediately after shock.	Correct.	42 (56)	57 (74)	0.007
	Incorrect.	20 (26.7)	06 (7.8)	



	Not done.	13 (17.3)	14 (18.2)	
Overall performance.	All steps completed correctly.	18 (24.0)	31 (40.3)	0.007
	Not completed correctly.	57 (80.3)	46 (59.7)	

Most of the interns who were in their first half and second half of training were able to identify and correctly assess cardiac arrest victim. Compare to interns with less than 06 months training (69.3%) higher portion of interns (79.2%) who completed more than 06 months of training were able to perform chest compression correctly. But it was not significant statistically. Meanwhile, in giving rescue breath (96.1% vs 62.7%) and resuming compression after rescue breath (83.1% vs 40%), interns who completed more than 06 months of training were more accurate and it was statistically significant. Both intern group with less than 06 months 60% and more than 06 months 50.6% training were having poor skills in handling defibrillator and giving shock. 74% interns who had more than 06 months training and 56% with less than 06 months training were able to resume chest compression immediately after giving shock and it was not significant statistically. 403% of interns with more than 06 months training and 24% of interns with less than 06 months training completely performed all the steps in advanced life support.

**Table 10. Distribution of ALS skills by pre- intern exposure to ALS training.**

Skills checked	Responses	Pre- intern exposure		P value
		Exposed N (%)	Not exposed N (%)	
Identify and assess cardiac arrest.	Correct.	140 (97.2)	07 (87.5)	0.133
	Incorrect.	04 (2.8)	01 (12.5)	
	Not done.	0 (0.0)	0 (0.0)	
Start and perform chest compression.	Correct.	105 (72.9)	08 (100)	0.088
	Incorrect.	39 (27.1)	0 (0.0)	
	Not done.	0 (0.0)	0 (0.0)	
Give Rescue Breath.	Correct.	113 (78.5)	08 (100)	0.141
	Incorrect.	31 (21.5)	0 (0.0)	
	Not done.	0 (0.0)	0 (0.0)	
Resume chest compression Cycle- 2	Correct.	92 (63.9)	08 (100)	0.111
	Incorrect.	35 (24.3)	0 (0.0)	
	Not done.	17 (11.8)	0 (0.0)	
Handle defibrillator and give shock	Correct.	64 (44.4)	04 (50.0)	0.758
	Incorrect.	80 (55.6)	04 (50.0)	
Resume compression immediately after shock.	Correct.	94 (65.3)	05 (62.5)	0.834
	Incorrect.	25 (17.4)	01 (12.5)	
	Not done.	25 (17.4)	02 (25)	
Overall performance.	All steps completed correctly.	45 (31.3)	04 (50.0)	0.215
	Not completed correctly.	99 (68.7)	04 (50.0)	

97.2% of participants who got exposed to any form of ALS training prior to intern training and 87.5% of participants who did not get exposed correctly identified and assessed cardiac arrest victim. Majority of interns performed chest compression correctly (72.9% and 100%) and gave rescue breath

effectively (78.55 and 100%) it was not significant statistically. Respectively, 63.9% of exposed and 100% of not exposed participants to ALS training before intern training resumed chest compression correctly after rescue breath. 44.4% of exposed participants and 50% of not exposed participants were able to handle defibrillator correctly and deliver shock. 31.3% of exposed interns and 50% of not exposed interns were able to complete all the steps in ALS completely and correctly and statistically it was not significant (Table

**Table 11. Overall performance of participants in advanced life support.**

Description	N (%)
Completed all the steps correctly	45 (29.6)
Did not complete all the steps correctly	107 (70.4)

Only 29.6% of interns were able to complete all the major steps of advanced life support.

**Table 12. Distribution of attitude toward ALS by knowledge score.**

Attitude questions.	Responses	Knowledge score			P Value
		Good ( $\geq 70$ ) N (%)	Average (50 - 69) N (%)	Poor (<50) N (%)	
I Feel that my internship training is adequate to equip me to handle resuscitation confidently.	Yes	57 (68.7)	18 (40.9)	13 (52.0)	0.001
	No	26 (31.3)	24 (54.5)	07 (28.0)	
	Not sure	00	02 (4.5)	05 (20)	
Resuscitation should be initiated by a senior Medical Officer.	Yes	07 (8.4)	04 (9.1)	06 (24)	0.084
	No	76 (91.6)	40 (90.9)	19 (76.0)	
All junior doctors should have advance life support (ALS) course training before practices.	Yes	83 (100)	44 (100)	25 (100)	
	No	00	00	00	
ALS course should be taught during undergraduate years.	Yes	82 (98.8)	44 (100)	23 (92.0)	0.025
	No	01 (1.2)	00	00	
	Not sure	00	00	02 (8.0)	
Are you confident enough in selecting or giving emergency drugs?	Yes	69 (83.1)	11 (25)	10 (40)	0.001
	No	06 (7.2)	19 (43.2)	17 (28)	
	Not sure	08 (9.6)	14 (31.8)	08 (32)	
Did you attend pre-intern ALS training program arranged by ministry?	Yes	73 (88)	36 (81.8)	13 (52)	0.001
	No	10 (12)	08 (18.2)	12 (48)	
Do you think that pre- intern ALS training program arranged by ministry of health is useful?	Yes	76 (91.6)	40 (90.9)	25 (100)	0.067
	No	02 (2.4)	04 (9.1)	00	
	Not sure	05 (6.0)	00	00	
Do you think that ALS course should be re- evaluated frequently?	Yes	83 (100)	44 (100)	21 (84)	0.001
	No	00	00	02 (8.0)	
	Not sure	00	00	02 (8.0)	
	Yes	55 (66.3)	15 (34.1)	08 (32)	0.002

Do you think that you are confident enough in saving a life with your ALS knowledge?	No	04 (4.8)	04 (9.1)	02 (8.0)	
	Not sure	24 (28.9)	25 (56.8)	15 (60)	

While, 68.7% of interns with good knowledge level, 40.9% of interns with average knowledge level and 52% of interns with poor knowledge level believed intern is adequate to handle resuscitation confidently, 54.5% with average knowledge and 28% with poor knowledge believed intern is not enough. It was significant statistically. Majority of interns with good, average and poor knowledge did not agree that resuscitation should be started by senior medical officers. Almost 100% of interns with good, average and poor knowledge agreed that all junior doctors should have ALS training prior to practice. While 98.8% of interns with good knowledge and 100% of interns with average knowledge accepted that ALS course should be taught to undergraduates, only 92% of interns with poor knowledge level agreed on this. Statistically it was significant. Around 83.1% of interns with good knowledge level were confident in selecting and administering emergency drugs. Meantime only 25% of average knowledge level and 40% of poor knowledge level interns were confident in selecting and administering emergency drugs and it was statistically significant. 88% of interns with good knowledge and 81.8% of interns with average knowledge level had attended resuscitation program held by ministry of health. 48% of interns with poor knowledge had not attended the program and it was statistically significant. Majority of interns from all three level of knowledge category believed that resuscitation program held by ministry was useful. While 100% of good and average knowledge level interns thought ALS course should be re- evaluated frequently, only 84% of interns with poor knowledge level thought the same. It was significant statistically. 66.3% of good knowledge level and 34.1% of average knowledge level students were confident in saving life with their current ALS knowledge. Strangely, 56.8% of average knowledge level and 60% of poor knowledge level interns were not sure about their ability to save a life with their current ALS knowledge. It was statistically significant

**Table 13. Distribution of ALS skills by knowledge score.**

Skills checked	Responses	Knowledge score.			P value
		Good (≥70) N (%)	Average (50 - 69) N (%)	Poor (<50) N (%)	
Identify and assess cardiac arrest.	Correct.	81 (97.6)	43 (97.7)	23 (92.0)	0.352
	Incorrect.	02 (2.4)	01 (2.3)	02 (8.0)	
	Not done.	00	00	00	
Start and perform chest compression.	Correct.	64 (77.1)	34 (77.3)	15 (60.0)	0.199
	Incorrect.	19 (22.9)	10 (22.7)	10 (40.0)	
	Not done.	00	00	00	
Give Rescue Breath.	Correct.	67 (80.7)	36 (81.8)	18 (72)	0.581
	Incorrect.	16 (19.3)	08 (18.2)	07 (28.0)	
	Not done.	00	00	00	
Resume chest compression Cycle- 2	Correct.	58 (69.9)	30 (68.2)	12 (48.0)	0.105
	Incorrect.	16 (19.3)	08 (18.2)	11 (44)	
	Not done.	09 (10.8)	06 (13.6)	02 (8.0)	
Handle defibrillator and give shock	Correct.	47 (56.6)	13 (29.5)	08 (32.0)	0.005
	Incorrect.	36 (43.4)	31 (70.5)	17 (68.0)	
Resume compression immediately after shock.	Correct.	57 (68.7)	23 (52.3)	19 (76.0)	0.229
	Incorrect.	14 (16.9)	09 (20.5)	03 (12.0)	
	Not done.	12 (14.5)	12 (27.3)	03 (12.0)	
Overall performance.	All steps completed correctly.	35 (42.2)	08 (18.2)	06 (24)	0.014

	Not completed correctly.	48 (57.8)	36 ((81.8)	19 (76.0)	
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Majority of interns with good, average and poor knowledge level correctly identified and assessed cardiac arrest victim. Considerable proportion of interns from poor knowledge category was unable to perform chest compression correctly. But it was not significant statistically. Only 29.5% of average knowledge and 32% of poor knowledge level interns were able to handle defibrillator and give shock correctly while 56.6% of interns with good knowledge were able to perform it correctly. It was statistically significant. 42.2% of interns with good knowledge, 18.2% of interns with average knowledge and 24% of interns with poor knowledge level only completed all the stages in advanced life support correctly and it was statistically significant

## DISCUSSION.

More than one million deaths annually occur world widely due several critical illnesses and circumstances. According to US centers for disease control and prevention has estimated 400- 450,000 sudden cardiac death around USA. Netherlands reported an annual incidence rate of sudden cardiac arrest of 90- 100/100,000 residents aged 20- 75 (Chugh et al., 2008). According to the latest WHO data released in 2017, In Sri Lanka, deaths due to coronary heart disease has reached 28,554. This accounts for 22.52% of total deaths and ranked 73 in the world. Several factors contribute to the positive as well as negative outcome of medical emergencies. In an emergency due to a cardiac arrest, inside or outside the hospital, Basic Life Support (BLS) and Advanced Life Support (ALS) are crucial in saving victims (Ryynänen et al., 2010). The foundation of any lifesaving effort is BLS. ALS requires more equipment and medicines and the important role of ALS in an emergency is universally proven and accepted. It is important that both medical and non-medical personal being familiar with BLS and ALS. But medical personals are more responsible toward ALS and it is their duty and responsibility being familiar and having thorough knowledge of ALS. In Sri Lankan context, both medical students and trainee doctors are taught and trained in advanced life support according to the United Kingdom resuscitation council guidelines.

### Participant's Knowledge in ALS.

The mean knowledge score of this study population was 68.71 and 16.4% of the participants had poor knowledge score. Almost same result had reported in a study including intern medical officers and medical students as 12.75% had poor knowledge level (Ralapanawa et al., 2016). In contrast in another study which included intern medical officers of two universities reported 45.2% of interns to have poor knowledge score (Avabratha et al., 2012). Meantime in a study to assess the knowledge of Dental intern and post graduate students knowledge and attitude about BLS, 17.6% dental interns had poor knowledge and only 19.6% demonstrated good knowledge (Pundalika et al., 2015). Detailed analysis of knowledge scores of this study revealed there was statistically significant difference (0.006) among different age groups. Younger aged interns had good knowledge score and it was declining with age. Strangely, the age group >36 also reported to have good knowledge score. Meanwhile, a systematic review of retention of adult advanced life support knowledge and skills reported as available studies suggest that ALS knowledge and skills decays after 06 months and 01 year of ALS training (Yang et al., 2012). High knowledge level among >36 aged interns of this study can be attributed to them having repeatedly studied and prepared for Examination for Registration to Practice Medicine (ERPM) exam, as all of them found to be foreign university graduates. Male and female interns also showed statistically significant difference (0.006) in knowledge score level. Another study also reports as male participants to be having good knowledge score of CPR compare to females (Tsegaye, Tesfaye and Alemu, 2015). But the study by Ralapanawa- 2016, mentioned above did not demonstrate statistically significant difference in ALS knowledge level among female and male participants (Ralapanawa et al., 2016). There was no statistically significant difference of knowledge score among intern medical officers with <06 months training and >06 months training. Similar result reported in audit on knowledge on CPR among intern House Officers at the National Hospital of Sri Lanka, in which average knowledge scores were 55.6% and 51% respectively and there was no statistically significant difference (Anaesthetist and Lanka, 2005). Knowledge score among Sri Lankan university graduates and foreign university graduates also did not show statistically significant difference. Meanwhile interns with previous exposure to ALS training showed statistically significant difference (0.001) in ALS knowledge score compare to interns with no exposure to previous ALS training. Almost same result reported in a study conducted to assess the effect of advanced life support training in which almost all the participant groups showed increase in ALS knowledge level following exposure to ALS training ('effect of advanced life support training.pdf', no date). Repeated exposure to ALS training would have attributed to such outcome. Similar results reported in another study conducted to assess impact of advanced cardiac life support training program on the outcome of cardio pulmonary resuscitation on which the knowledge level and skills in advanced cardiac life support of healthcare professionals improved after the training (Sodhi, Singla and Shrivastava, 2010).

### Participant's Attitudes toward ALS.

Having good knowledge in ALS is paramount important. Having positive attitudes toward ALS and being confident in handling life threatening emergencies also equally or more then important to having good knowledge in ALS. Major proportion of participants believed intern training is adequate to handle resuscitation confidently. Almost 100% of interns agreed that integrating ALS training program into undergraduate curriculum is important. Almost same finding reported in a study conducted in Sri Lanka 2016, found that 96.3% of the participants agreed integrating ALS training program into undergraduate curriculum is important (Ralapanawa et al., 2016). 80.3% of participants had attended ALS program carried out by Health ministry prior to the commencement of intern training. 72.4% of interns believed ALS program carried out by Health ministry is useful in handling emergencies. Strangely 4% disagreed on this and 23.6% were not sure about the usefulness of the program. Crowded teaching setups, different teaching styles and techniques and individual factors of intern medical officers would have attributed to this outcome. Considerably number of interns declared as they are not confident in selecting and administering emergency drugs. (21.1%) and 42.1% of interns were not sure about their ability to save a life with their current ALS knowledge. Lack of confidence among interns reported in another study also. In that study 55.5% were not confident in selecting and

administering emergency drugs and 32.1% were not confident in saving a life (Ralapanawa et al., 2016). This can be due to lack of opportunities to be exposed to emergencies and gain experiences as most of the hospitals with interns having separate emergency care units where emergencies managed. Here the male participants were having high knowledge score level as well as higher confidence in drug selection and lifesaving. Hence it is important that female participants gain more knowledge and develop practical skills in ALS.

### Participant's Skills in ALS.

Unlike other fields of study, medical field need good knowledge with high quality skills to practice medicine more successfully. Having correct skills in ALS is most important to any medical officers without any doubts. It has reported as ALS given by skilled paramedical staffs out of hospital cooperatively increased the survival of victims compare to ALS given by non- skilled paramedics (Woodall et al., 2007). In this study most of the intern medical officers were able to identify, assess cardiac arrest victims and initiate resuscitation immediately and correctly. But effectiveness of rescue breath (0.001) and resuming chest compression immediately after giving shock (0.031) was noticeably low with female intern officers compare to males and it was statistically significant. But Akoijam et al., 2017 demonstrated that there was no statistically significant difference in skills in ALS among male and female participants. Intern medical officers with <06 months exposure to intern training was having less skills in rescue breath resuming (0.001) and chest compression after rescue breath (0.001) compare to the interns with >06 months intern training. It was statistically significant. As intern training bring more exposure to emergencies, long period of intern training would have attributed to this difference. Similar findings demonstrated by (Sodhi, Singla and Shrivastava, 2010), (Quan et al., 2001) and ('effect of advanced life support training.pdf', no date) as more training and exposure to ALS increases knowledge and skills in ALS. Both male (43.6%) and female (46.6%) participants were lack in skills to handle defibrillator and give shock. An important report of Cardio Pulmonary Resuscitation of adult in the hospital which analyzed 14,720 advanced cardiac life supports given to cardiac arrest victims reported as, if the shock given in >1 minute time to the patient with indication, the survival rate is around 75% and if the shock given within 3 minute time the survival decrease to 38% and if it given in 3minute the survival rate decreases further to 21% (Peberdy et al., 2003). As timely defibrillation is important to safeguard cardiac arrest victim, It is unfortunate that, nearly half of the interns with good knowledge score also were unable to handle different type of commonly available biphasic defibrillator in government hospitals. This may be due to lack of exposure to defibrillators and emergencies. This warrants more attention should be given to train intern medical officers in handling defibrillator and giving shock. Only 29.6% of intern medical officers who participated in the study were able to demonstrate all the stages in ALS correctly. Similar result demonstrated by Zaheer and Haque, 2009 among medical students to assess their awareness and skills in CPR. In this study it has found only 21% of students is to have skills in CPR. In another study done in India 2017, Intern medical officers skills in CPR observed to be less than fifty percent on average (Akoijam et al., 2017).

### CONCLUSION.

From this study, it can be concluded that nearly 16.4% of interns demonstrated inadequate knowledge level in ALS. Most of the participant showed positive attitudes toward ALS. Meanwhile only half of the interns were confident in saving a life with their current ALS knowledge and nearly one- third of the interns only were confident in selecting and administering emergency drugs. And it was a considerably significant finding as it must be addressed properly to improve the outcomes of resuscitations. Over 90% or participants were capable of performing initial steps of ALS correctly. More than two-third of interns were unable to complete all the steps in ALS correctly. It is important indicating that, the skills of intern medical officers in handling defibrillator and giving shock was very low. Over 55% of interns were lacking skills in handling defibrillator and giving shock. Lower percentage in overall performance in ALS and significantly lack of skills in handling defibrillator strongly indicates the need for frequent skill trainings in ALS to intern medical officers with more focus on handling defibrillator and giving shock. The Intern medical officers with good knowledge level demonstrated more positive attitude toward ALS. And the intern medical officers with highest knowledge score were more skillful in ALS.

### RECOMMENDATIONS.

1. ALS teaching and training should become a standardized and mandatory component in undergraduate curriculum and should be regularly conducted during undergraduate level.
2. ALS teaching and training given by health ministry, Sri Lanka prior to the commencement of intern training must be continued with more focus in skills training such as Handling defibrillator and giving shock.
3. ALS training should not be limited to pre- intern level. It should be continued during intern training period and should include other category of medical officers also
4. ALS training and teaching should be revised regularly with continues medical education (CME).
5. ALS knowledge and attitudes among intern medical officers should be evaluated and uplifted during and at the end of the intern training period.
6. More researches on large scale around Sri Lanka are necessary in both BLS and ALS. It will help to improve the healthcare system

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