

The resuscitation knowledge and skills of Intern Doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex

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A research report submitted to the Faculty of Health Sciences, University of the Free State, Bloemfontein, in partial fulfilment of the requirements for the degree Masters of Medicine in the branch of Anaesthesiology.

Bloemfontein 2015

DECLARATION

I, Jacques Geldenhuys, declare that this research protocol is my own work. It is being submitted for the degree of Master of Medicine in the Department of Anaesthesiology at the Faculty of Health Sciences, University of the Free State, Bloemfontein. It has not been submitted before for any degree or examination at this or any other University.

J Geldenhuys
2011057151

23 August 2015

For my parents, who will be proud.

PREFACE

Upon completion of six years at medical school, I thought I was ready to take on the world. Amazing how quickly that thought passed after the first few after hour calls as an Intern doctor, where you are constantly confronted with cases, events and decisions, you need to take responsibility for.

Early on during my Internship I realised that I was not prepared to deal with resuscitations by myself. Taking charge of the Surgical Sub-Specialities after hours really scared me. Some nights the pager will bleep non-stop as you run between the Burns Unit, Paediatric Surgery Unit, Trauma Resuscitation Unit and Head, Neck and Breast Unit.

I quickly decided to face my demons and enrolled for the ACLS course. Upon completion of the ACLS course, some friends and I decided to go all in and completed the PALS, NLS and ATLS courses as well.

After completion of these courses, I really felt empowered. My fear for resuscitation disappeared. I was confident in the skills I learned from these courses.

In my opinion these courses are extremely valuable, and I'm forever encouraging junior doctors to enrol in an ACLS course. It will give you the necessary knowledge and skill to run a successful resuscitation.

With this study I had the opportunity to assess our junior colleges, by exposing them to written evaluations and simulated resuscitation scenarios, to evaluate their knowledge, skills and level of confidence.

Dr Jacques Geldenhuys

Bloemfontein 2015

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ABSTRACT

BACKGROUND

Intern doctors are often regarded as first responders to attend to patients in emergency situations. But the fact is that many Intern doctors are not equipped with the necessary knowledge and skills to carry out effective cardiopulmonary resuscitation. It was also noted that Intern doctors might not be aware of gaps in their resuscitation knowledge and skills.

OBJECTIVES

The aim of the study is to determine the theoretical knowledge and practical skill on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex. Their resuscitation knowledge will be tested based on the 2010 American Heart Association's guidelines for Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS) and Paediatric Advance Life Support (PALS). We will determine the Intern doctors' knowledge and skills on resuscitation during the first and again during the last week of their rotation in the Department of Anaesthesiology.

METHOD

After approval from the Research Division of the Ethics Committee of the University of the Free State, 26 Intern doctors were enrolled in the study. They completed a demographic questionnaire, written a multiple choice test, and performed a skills evaluation in a simulation centre; to assess their adequacy of performing effective cardiopulmonary resuscitation. Follow-up evaluation was done at the end of their two-month rotation in the Department of Anaesthesia

RESULTS

The average result for the pre-rotation written test was 58.4% (14.6/25), while they scored unsatisfactory in the practical skills assessment. The biggest problem areas identified were the quality of chest compressions, and the use of a defibrillator. There was no improvement with the follow-up evaluation at the end of their two-month

rotation. The resuscitation knowledge and skills of the Intern doctors were rated as unsatisfactory.

CONCLUSION

The following conclusions can be drawn from the study:

1. Intern doctors are not equipped to provide adequate cardiopulmonary resuscitation.
2. The undergraduate resuscitation training programs that are currently in place are not adequate to equip Intern doctor with the necessary knowledge and skills to provide adequate cardiopulmonary resuscitation; or the knowledge and skills obtained, are not retained.
3. Active advanced life support training programs should be initiated to help provide Interns with the necessary knowledge and skills to provide adequate cardiopulmonary resuscitation.
4. Current resuscitation training programs need to be seriously re-evaluated, and aimed at improving Interns knowledge and skills.

ACKNOWLEDGEMENTS

I am grateful to the following people:

Dr EW Turton, my mentor and supervisor, for his endless advice, encouragement and support during the supervision of this project.

Prof CL Odendaal, our resuscitation expert, for all his input and help in setting up the evaluations

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Dr M Labuschagne, and his team at the Simulation Unit, for their time and effort in setting up and performing the evaluations.

Dr J de Beer, my friend and colleague, for all his support during this project.

The Department of Anaesthesiology, University of the Free State, for the research time given to collect my data.

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ABBREVIATIONS

The following abbreviations shall be used in this study:

AHA: American Heart Association

BLS: Basic Life Support

ACLS: Advance Cardiac Life Support

PALS: Paediatric Advance Life Support

CPR: Cardio-Pulmonary Resuscitation

VT: Ventricular Tachycardia

VF: Ventricular Fibrillation

PEA: Pulseless Electrical Activity

ROSC: Return of Spontaneous Circulation

DEFINITIONS

The following definitions shall be used in this study:

Bloemfontein Academic Hospital Complex: This is an academic hospital complex consisting of Universitas Academic Hospital, Universitas Annex and Pelonomi Regional Hospital, all associated with the University of the Free State.

Universitas Academic Hospital: This is an academic hospital associated with the University of the Free State, and part of the Bloemfontein Academic Hospital Complex. It is a tertiary hospital acting as a referral hospital for a number of smaller regional hospitals and clinics.

Universitas Annex: This is an academic hospital associated with the University of the Free State, and part of the Bloemfontein Academic Hospital Complex. It is a tertiary hospital acting as a referral hospital for a number of smaller regional hospitals and clinics. Universitas Annex functions as an annex to Universitas Academic Hospital.

Pelonomi Regional Hospital: This is a regional hospital associated with the University of the Free State, and part of the Bloemfontein Academic Hospital Complex. It is a secondary hospital acting as a referral hospital for a number of smaller regional and district hospitals, and clinics.

Intern doctor: A newly qualified doctor currently working under supervision for a period of twenty four months.

Anaesthesiology rotation: A period of two-months within the internship period for practice and training in Anaesthesiology under supervision.

SimMan: a computer based simulation manikin.

CHAPTER 1

INTRODUCTION

In Chapter 1 an overview of the study shall be given. The following shall be addressed:

- A brief introduction of the literature review, more formally discussed in Chapter 2.
- The problem statement, as well as the aims and objectives of the study.
- The ethical considerations.
- An outline of the research methodology, more formally discussed in Chapter 3.
- The significance of the study.
- The potential limitations of the study.
- An outline of the research report

1.1 Introduction

Resuscitation is the art of restoring life. It is the manual application of chest compressions and ventilations to patients in cardiac arrest, done in an effort to maintain viability until advanced help arrives. Cardiopulmonary resuscitation is a series of lifesaving actions that improve the chance of survival following cardiac arrest. Cardiac or respiratory arrest can be managed efficiently by proper knowledge and practice of resuscitation skills.¹ The science of cardiopulmonary resuscitation is dynamic and ever changing as new evidence continuously comes to light. A detailed knowledge of the most up-to-date resuscitation guidelines is essential.²

Intern doctors are often regarded as first responders to attend to patients in emergency situations. But the fact is that most Intern doctors are not equipped with the necessary knowledge and skills to carry out effective cardiopulmonary resuscitation.^{3,4}

Numerous studies have shown the lack of this vital resuscitation knowledge and skills among junior doctors.^{3,5,6} These studies evaluated junior doctors' theoretical knowledge of basic resuscitation at the hand of a questionnaire and their practical skills based on resuscitation efforts carried out on a manikin with a skill meter.⁵ A previous study carried out in the Department of Anaesthesiology, Bloemfontein

Academic Hospital Complex, where theoretical knowledge on basic and advanced life support in Intern doctors were evaluated, did not differ from international studies. Though this study is unpublished, together these two studies will be prepared for publishing.

With this study we shall revisit the topic. We shall determine the resuscitation knowledge of Intern doctors at the start and again at the end of their rotation through the Department of Anaesthesiology based on The American Heart Association's 2010 guidelines. Furthermore, we shall determine their practical skills on these guidelines and whether their knowledge and skills improved during their two-month rotation in the Department of Anaesthesiology.

1.2 Problem statement

The art of resuscitation is taught in numerous undergraduate programs, as well as postgraduate programs, by various departments during Internship. With all the current programs in place, we need to determine if we are actually succeeding in equipping our Intern doctors as first responders to resuscitation events.

We need to determine if Intern doctors have the necessary knowledge and skill to react to resuscitation events, and evaluate our current training programs to see how we can improve on them.

1.3. Aim and Objectives

1.3.1 Aim of the Study

The aim of the study is to determine the theoretical knowledge and practical skill on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex. Their resuscitation knowledge will be tested based on the 2010 American Heart Association's guidelines for Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS) and Paediatric Advance Life Support (PALS). We will determine the Intern doctors' knowledge and skills on resuscitation during the first and again during the last week of their rotation in the Department of Anaesthesiology.

1.3.2 Objectives of the Study

To determine the theoretical knowledge and practical skills on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex at the beginning of their two-month rotation.

To determine the theoretical knowledge and practical skills on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex at the end of their two-month rotation.

To compare test scores at the beginning of their rotation in the Department of Anaesthesiology to those at the end of their rotation.

To compare the theoretical and practical knowledge on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex based on background information e.g. undergraduate medical school attended, inclusion of BLS, ACLS and PALS in undergraduate curriculum, BLS, ACLS, ATLS or PALS qualifications, previous exposure to cardio pulmonary resuscitation, first or second year of Internship, previous rotations in Internship, future career plans and whether they are familiar with the 2010 resuscitation guidelines.

1.5 Location of the Study

The study will take place in the Department of Anaesthesiology and the Clinical Simulation Unit at the Faculty of Health Sciences of the University of the Free State in Bloemfontein.

1.6 Ethical considerations

Ethics clearance for the study shall be obtained from the Ethics Committee of the Faculty of Health Sciences of the University of the Free State, Bloemfontein, South Africa, prior to the commencement of our study.

Approval for the study shall be obtained from the relevant authorities of the Pelonomi Regional Hospital, including the internship coordinator and Head of the Department of Anaesthesiology, prior to commencement of the study.

Informed consent shall be obtained from participants by means of an information sheet and written consent form. Consent shall include participation in the study, but also the use of the information gathered for research purposes and publication. Steps shall be taken to ensure confidentiality, with each participant given a participants number.

Participation or non-participation shall not benefit or disadvantage participants in any way.

1.7. Research methodology

1.7.1 Research design

The study will follow a cross-sectional research design, with a before-and-after component. The information will be gathered by means of a questionnaire, written test and practical test. The two-month rotation in the Department of Anaesthesiology will serve as the intervention for the before-and-after component.

1.7.2 Study population

The study will include all Intern doctors rotating in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex from March 2014 to December 2014.

1.7.3 Inclusion and exclusion criteria

1.7.3.1 Inclusion criteria

All Intern doctors rotating through the Department of Anaesthesiology between March 2014 and December 2014, who gave consent to participate and are able to complete the study questionnaire and evaluation under examination conditions will be included in the study.

1.7.3.2 Exclusion criteria

Intern doctors that refuse to participate or unable to complete the study questionnaire and tests under examination conditions will automatically be excluded from the study.

1.7.4 Schedule of dates

Ethical committee approval shall be obtained in March 2014.

Pelonomi Regional Hospital, Intern co-ordinator and Head of Department of Anaesthesiology approval will be obtained in March 2014.

The data collection shall be obtained between March 2014 and December 2014.

Analysis of the data collected shall take place in June 2015.

Writing of the research report will follow in August 2015.

1.7.5 Construction of the instrument

The study shall take the form of a questionnaire. The questionnaires will consist of 3 parts: a demographic survey, a multiple choice questionnaire and a practical CPR skills evaluation.

The multiple choice questionnaires and the practical CPR skills evaluation are both based on the AHA 2010 resuscitation guidelines and AHA 2010 cardiac arrest algorithms respectively. For further validation these shall undergo expert review.

1.7.6 Procedure for data collection

The study population shall be invited to voluntarily participate in the study on the first and last Friday of their rotation in the Department of Anaesthesiology. Subsequent data collection shall take place between March 2014 and December 2014.

Completion of the questionnaire shall have no time limit, but shall be conducted under exam conditions, without consultation between participants or of reference material. Dr J Geldenhuys shall invigilate questionnaire completion.

1.7.7 Data analysis

The data shall be entered into a database and the analysis to be done by the Department of Biostatistics, University of the Free State. Results will be summarised by frequencies and percentages (categorical variables) and means and standard deviations or percentiles (numerical variables). Subgroup comparison shall be by

means of 95% confidence intervals for differences in percentages, means or medians. A p-value of less than 0.05 shall be considered as significant.

Pre-and Post-rotation knowledge and skills of the participants tested, will be compared. Their knowledge and skills on resuscitation would be judged satisfactory if a mark of 80% or more is obtained in the tests. The demographic information of participants will be available for further subgroup comparisons.

1.8. Significance of the Study

The significance of this study is that it will allow for assessment whether or not Intern doctors are equipped to act as responders to resuscitation situations, whether the current training programs; whether under graduate or postgraduate, are of adequate standard or value, and where we as a department are falling short in adequately training and preparing our Intern doctors. Also to evaluate the follow-up times between resuscitation training programs, for knowledge and skill retention purposes.

1.9. Potential Limitations of the Study

The following potential limitations of this study have been identified:

- The study is contextual and the study population may not be representative of the national intern group nor of intern groups preceding or following them.
- While every effort shall be made to avoid it, bias secondary to preparation may occur.
- The study cannot test all resuscitation knowledge and skills.
- Not all participants will have pre-and post-rotation questionnaires, as some will be lost due to post call or annual leave.
- The sample size of the study is very small.

1.10 Research Report Outline

This research report shall consist of the following chapters:

Chapter 1: An introduction to the study, including the aim and objectives of the study, and a brief summary of the methodology used.

Chapter 2: A review of the literature pertinent to the topics raised by the study.

Chapter 3: A description of the methodology used for the study.

Chapter 4: The results of the study.

Chapter 5: Interpretation and discussion of results.

Chapter 6: Summary of research and conclusion.

Chapter 7: References

In Chapter 1 we have given an overview of the study, including a brief introduction of the literature review, the problem statement, aims and objectives of the study, the ethical considerations, an outline of the research methodology, the significance of the study, the potential limitations of the study and an outline of the research report.

CHAPTER 2

LITERATURE REVIEW

In Chapter 2 an overview of the literature relevant to the topics raised by the study shall be given.

Resuscitation is the art of restoring life. It is the manual application of chest compressions and ventilations to patients in cardiac arrest, done in an effort to maintain viability until advanced help arrives. Cardiopulmonary resuscitation is a series of lifesaving actions that improve the chance of survival following cardiac arrest. Cardiac or respiratory arrest can be managed efficiently with proper knowledge and practice of resuscitation skills.¹ The science of cardiopulmonary resuscitation is dynamic and ever changing as new evidence continuously comes to light. A detailed knowledge of the most up-to-date resuscitation guidelines is essential.²

Intern doctors are often regarded as first responders to attend to patients in emergency situations. But the fact is that many Intern doctors are not equipped with the necessary knowledge and skills to carry out effective cardiopulmonary resuscitation.^{3,4} It was also noted that Junior doctors might not be aware of gaps in their professional knowledge and skills.⁵

Numerous studies have shown the lack of this vital resuscitation knowledge and skills among junior doctors.^{3,6,7} These studies evaluated junior doctors' theoretical knowledge of basic resuscitation at the hand of a questionnaire and their practical skills based on resuscitation efforts carried out on a manikin with skill meter.⁶ A previous study carried out in the Department of Anaesthesiology, Bloemfontein Academic Hospital Complex, where theoretical knowledge on basic and advanced life support in Intern doctors were evaluated, did not differ from international studies.

Cameron et al found all Intern doctor studies expressed a lack of confidence in their ability to effectively resuscitate a patient at the end of their internship and that 67% of junior doctors expressed a lack of confidence in using a defibrillator.⁵

Skills and training in resuscitation should be covered under the internship Domain of Anaesthesiology as outlined by the HPCSA published guidelines, which specify the skills and competencies internship doctors are expected to acquire during their internship Anaesthesiology rotation.⁸

With this study we shall revisit the topic. We shall determine the resuscitation knowledge of Intern doctors at the start and again at the end of their rotation through the Department of Anaesthesiology based on The American Heart Association's 2010 guidelines. Furthermore, we shall determine their practical skills on these guidelines and whether their knowledge and skills improved during their two-month rotation in the Department of Anaesthesiology.

In chapter 2 we reviewed the current literature and discussed topics pertinent to this research project.

CHAPTER 3

METHODS

This chapter shall provide an in-depth description of the methodology used for the study.

3.1 Introduction

Junior doctors are expected to act as first responders in resuscitation situations. They are often not confident enough, and do not have the necessary knowledge and skills to successfully resuscitate patients in emergency situations.

The aim of the study is to determine the theoretical knowledge and practical skill on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex. Their knowledge and skills on resuscitation will be evaluated during the first and again during the last week of their rotation in the Department of Anaesthesiology.

The two-month rotation in the Department of Anaesthesiology will serve as an intervention. During this time they will be regularly exposed to resuscitation situations and attend discussions within the Department of Anaesthesiology.

The objectives of this study include:

To determine the theoretical knowledge and practical skills on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex at the beginning of their two-month rotation.

To determine the theoretical knowledge and practical skills on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex at the end of their two-month rotation.

To compare test scores at the beginning of their rotation in the Department of Anaesthesiology to those at the end of their rotation.

To compare the theoretical and practical knowledge on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex based on background information e.g. undergraduate medical

school attended, inclusion of BLS, ACLS and PALS in undergraduate curriculum, BLS, ACLS, ATLS or PALS qualifications, previous exposure to cardio pulmonary resuscitation, first or second year of Internship, previous rotations in Internship, future career plans and whether they are familiar with the 2010 resuscitation guidelines.

3.2 Study Design

The study will follow a cross-sectional research design, with a before-and-after component. The information will be gathered by means of a questionnaire, written test and practical test. The two-month rotation in the Department of Anaesthesiology will serve as the intervention for the before-and-after component.

3.3 Study Site

The study will take place in the Department of Anaesthesiology and the Clinical Simulation Unit at the Faculty of Health Sciences of the University of the Free State in Bloemfontein.

3.4 Study Population

A study population is a complete set of persons/ objects possessing a common characteristic that is of interest.

The study population for this study will include all Intern doctors rotating in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex from March 2014 to December 2014.

3.5 Study Period

The data collection for this study was done from March 2014 to December 2014.

3.6 Ethical Considerations

3.6.1 Authorisation

Ethics clearance for the study was obtained in March 2014 from the Research Division of the Ethics Committee of the University of the Free State, Bloemfontein, South Africa, prior to commencement of the study. (ECUFS NO 18/2014)

Approval for the study was obtained from the relevant Bloemfontein Academic Hospital Complex authorities, including the Intern co-ordinator and Head of the Department of Anaesthesiology, prior to commencement of the study.

3.6.2 Participation and Informed Consent

Intern doctors rotating in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex during March 2014 and December 2014 were approached by Dr J Geldenhuys and asked to volunteer to participate in the study.

Informed consent was obtained from Intern doctors for their voluntary participation by means of an information sheet and written consent form. Participation or non-participation did not directly or indirectly benefit or disadvantage the sample population in any way.

3.6.3 Confidentiality

Separating the intern doctor's consent and identification, by giving each a participant number and only refer to their participant number there after ensured confidentiality.

3.7 Sample Statement

Pre-and Post-rotation knowledge and skills of the participants tested, will be compared. Their knowledge and skills on resuscitation would be judged satisfactory if a mark of 80% or more is obtained in the tests. The demographic information of participants will be available for further subgroup comparisons.

3.8 Inclusion and exclusion criteria

3.8.1 Inclusion criteria

The following inclusion criteria were used for the study:

- Interns that give voluntary informed consent.
- Interns rotating through the Department of Anaesthesiology between March 2014 and December 2014.
- Ability to complete the study questionnaire and evaluation under exam conditions.

3.8.2 Exclusion criteria

The following exclusion criteria were used for the study:

- Refusal to volunteer for the study.
- Inability to complete the study questionnaire and evaluation under exam conditions.

3.9 Construction of the Instrument

The instrument took the form of questionnaires and practical skills evaluation.

This consisted of three parts:

- Demographic Survey
- Multiple Choice Questions
- Practical Skills Evaluation

3.9.1 Demographic Survey

The demographic survey section served to provide sub-categories within the study sample by which the data could be analysed. These included:

- Age.
- Sex.
- University where under graduate training was completed
- Whether a 5 or 6 year curriculum was followed
- Rotations preceding Anaesthesiology rotation.
- Future career plans
- Previous resuscitation training and exposure
- Confidence level in performing CPR

3.9.2 Multiple Choice Questionnaire

A question bank of a hundred questions was compiled by Dr J Geldenhuys. Questions were based on the AHA 2010 resuscitation guidelines. The questions covered different categories, which included BLS, ACLS, PALS, Pharmacology in Resuscitation and Rhythm identification. An expert on resuscitation – Prof C.L. Odendaal, validated all questions. Twenty five questions were randomly selected, five from each category, for each of the tests. The test format was that of written multiple choice questions in order to avoid any bias. The test was completed under examination conditions without consultation between participants or the use of reference material.

3.9.3 Practical Skills Evaluation

The practical skills evaluation will be done with the help of the Clinical Simulation Unit, School Of Medicine, University of the Free State. Participants will be required to

perform CPR on SimMan, a computer based simulation manikin, identify cardiac arrest rhythms and administer emergency drugs or defibrillate accordingly. A computer generated evaluation of the participants' effectivity, rate and depth, of CPR, as well as the drugs and dosages administered was obtained. Other actions were evaluated using tick sheet based on the AHA 2010 Cardiac Arrest Algorithm.

Evaluation was done retrospectively via video recording of the resuscitation simulation.

3.9.4 Validation of the instrument

Questions were based on the AHA 2010 resuscitation guidelines. The questions covered different categories which included BLS, ACLS, PALS, Pharmacology in Resuscitation and Rhythm identification. An expert on resuscitation – Prof C.L. Odendaal, validated all questions.

Checklist evaluation was based on the AHA 2010 Cardiac Arrest Algorithm.

3.10 Costs

Costs for the administration of this study were borne by Dr J Geldenhuys.

Costs included:

- Printing
- Photocopying
- Files for the questionnaires
- Files for storage of data for analysis

Participants in the study incurred no costs.

3.11 Data collection

The study population were invited to voluntarily participate in the study and data collection took place on the first and last Friday of the Intern rotations between March 2014 and December 2014.

There were 33 Intern doctors rotating in the Department of Anaesthesiology in the study period. Informed consent was obtained from Intern doctors for their voluntary participation by means of an information sheet and written consent form. Separating

the intern doctor's consent and identification, by giving each a participant number and only refer to their participant number there after ensured confidentiality.

Completion of the questionnaire had no time limit but was conducted under examination rules, without consultation between respondents or of reference material. Dr J Geldenhuys invigilated questionnaire completion.

3.12 Data Management/Analysis

The data was entered into a database and the analysis was done by Prof G Joubert from the Department of Biostatistics, University of the Free State. Results was summarised by frequencies and percentages (categorical variables), and means and standard deviations or percentiles (numerical variables). Subgroup comparison was done by means of 95% confidence intervals for differences in percentages, means or medians. A p-value of less than 0.05 was considered significant.

Pre-and Post-rotation knowledge and skills of the participants tested were compared. Their knowledge and skills on resuscitation was judged satisfactory if a mark of 80% or more is obtained in the tests. The demographic information of participants was used for further subgroup comparisons.

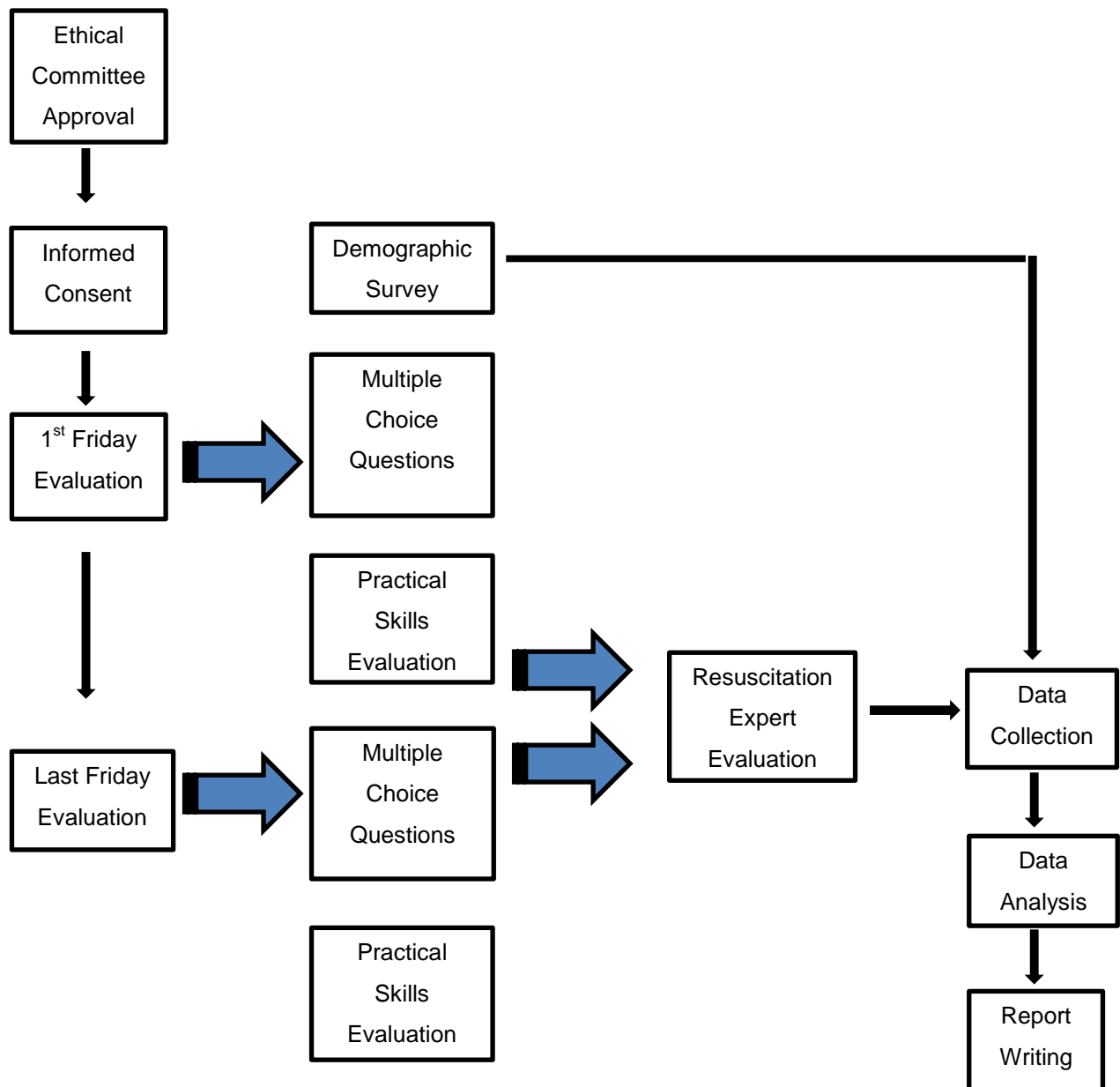


Figure 1 Illustration of instrument construction

In Chapter 3 we discussed the methodology used for the study in detail. The results of the study are presented in Chapter 4.

CHAPTER 4

RESULTS

In Chapter 4 we shall present the results of the study.

4.1 Introduction

Junior doctors are expected to act as first responders in resuscitation situations. They are often not confident enough, and do not have the necessary knowledge and skills to successfully resuscitate patients in emergency situations.

The aim of the study is to determine the theoretical knowledge and practical skill on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex. Their knowledge and skills on resuscitation will be evaluated during the first and again during the last week of their rotation in the Department of Anaesthesiology.

The two-month rotation in the Department of Anaesthesiology will serve as an intervention. During this time they will be regularly exposed to resuscitation situations and attend discussions within the Department of Anaesthesiology.

The objectives of this study include:

To determine the theoretical knowledge and practical skills on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex at the beginning of their two-month rotation.

To determine the theoretical knowledge and practical skills on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex at the end of their two-month rotation.

To compare test scores at the beginning of their rotation in the Department of Anaesthesiology to those at the end of their rotation.

To compare the theoretical and practical knowledge on resuscitation of Intern doctors working in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex based on background information e.g. undergraduate medical school attended, inclusion of BLS, ACLS and PALS in undergraduate curriculum, BLS, ACLS, ATLS or PALS qualifications, previous exposure to cardio pulmonary

resuscitation, first or second year of Internship, previous rotations in Internship, future career plans and whether they are familiar with the 2010 resuscitation guidelines.

4.2 Demographic Survey

4.2.1 Sample and Exclusions

The 33 Intern doctors rotating in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex were invited to voluntarily participate in the study. 7 Interns were excluded because of annual leave and being 'post call'. 26 Interns participated in the study [78.8% (26/33) of the study population]. Data was collected over a period of 10 months.

4.2.2 Results

As shown in [Table 1](#) 16 (61.5%) of the participants graduated from the University of the Free State. This is also reflected in the 19 (73.1%) participants that completed a 5 year Undergraduate curriculum. 11 (42.3%) of the participants completed their surgery rotation, and 15 (57.7%) their Family Medicine rotation. Both these departments have active resuscitation training programs in place for the Interns rotating there. The Internal Medicine rotation, which 20 (76.9%) of the participants completed, offers the most resuscitation exposure.

Most of the participants, 17 (65.4%) shown an interest in pursuing a career as a specialist. [Table 2](#) shows the relevant future career plans of the participants.

Upon questioning participants about their confidence level in performing successful resuscitation, 20 (84.6%) participants indicated that they have moderate confidence and only 3 (11.5%) indicated very confident. Results are shown in [Table 3](#).

From the information provided in [Table 4](#), we can see that only 11 (45.8%) of the participants had undergraduate advanced resuscitation training, and only 2 (7.7%) had formal ACLS training post-graduation.

[Table 5](#) and [Table 6](#) show the number of In-hospital resuscitations the participants have been exposed to, and the number of events per Intern year respectively. 18 (72.0%) participants had between 1 and 5 exposures, and 7 (28.0%) have been

exposed to more than 5 resuscitations. The Intern year didn't show any significant difference in their exposure.

4.3 Written Pre-Rotation test

4.3.1 Sample and Exclusions

The 33 Interns rotating in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex were invited to voluntarily participate in the study. 7 Interns were excluded because of annual leave and being 'post call'. 26 Interns participated in the written pre-rotation test [78.8% (26/33) of the study population]. Data was collected over a period of 10 months, on the first Friday of their rotation in the Department of Anaesthesiology.

4.3.2 Results

The result for the written pre-rotation test was 14.4 (57.6%). The Mean, Minimum, Maximum and Standard Deviation are shown in [Table 7](#).

Comparing the results of the Free State Graduates with the results of the other Graduates did not show any significant difference [$p = 0.06$ with 95% CI for difference (-2.8: 3.4)], as shown by Mean, Minimum, Maximum and Standard Deviation in [Table 8](#).

No significant differences were reflected in the results when comparing the different year groups of Interns, those who completed their Family Medicine and Surgery rotations against those who have not, or Interns with formal under-graduate training against those without. Results are shown by Mean, Minimum, Maximum and Standard Deviation in [Table 9](#), [Table 10](#) and [Table 11](#) respectively [$p=0.85$ with 95% CI for difference (-2.8; 3.4), $p=0.93$ with 95% CI for difference (-3.5; 3.8) and $p=0.64$ with 95% CI for difference (-3.9; 2.5) respectively].

4.4 Pre-Rotation Skills Evaluation

4.4.1 Sample and Exclusions

The 33 Interns rotating in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex were invited to voluntarily participate in the study. 7 Interns were excluded because of annual leave and being 'post call'. 26 Interns participated in the pre-rotation skills evaluation [78.8% (26/33) of the study

population]. Data was collected over a period of 10 months, on the first Friday of their rotation in the Department of Anaesthesiology.

4.4.2 Results

The results of the Pre-Rotation skills evaluation are shown in [Table 12](#). The result showed a clear lack in the quality of their CPR with only 2 (7.8%) participants that was able to push 'hard and fast' enough, being a rate of 100 compressions per minute and 5 cm deep. Only 3 (11.5%) participants were actively looking for reversible causes.

4.5 Written Post-Rotation test

4.5.1 Sample and Exclusions

The 33 Interns rotating in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex were invited to voluntarily participate in the study. 20 Interns were excluded because of annual leave and being 'post call'. 13 Interns participated in the written post-rotation test [39.4% (13/33) of the study population]. Data was collected over a period of 10 months, on the last Friday of their rotation in the Department of Anaesthesiology.

4.5.2 Results

The result for the written post-rotation test was 14.1 (56.4%). The Mean, Minimum, Maximum and Standard Deviation are shown in [Table 13](#).

4.6 Post-Rotation Skills Evaluation

4.6.1 Sample and Exclusions

The 33 Interns rotating in the Department of Anaesthesiology at the Bloemfontein Academic Hospital Complex were invited to voluntarily participate in the study. 20 Interns were excluded because of annual leave and being 'post call'. 13 Interns participated in the post-rotation skills evaluation [39.4% (13/33) of the study population]. Data was collected over a period of 10 months, on the last Friday of their rotation in the Department of Anaesthesiology.

4.6.2 Results

The results of the Post-Rotation skills evaluation are shown in [Table 14](#). The result showed a clear lack in the quality of their CPR with 0 (0%) participants pushing 'hard and fast' enough, being a rate of 100 compressions per minute and 5 cm deep. Only 5 (38.5%) participants were actively looking for reversible causes and 7 (53.9%) participants were able to recognise the Return of Spontaneous Circulation.

4.7 Comparison of Pre-and-Post-Rotation Written Test Results

4.7.1 Sample and Exclusions

Only 13 Interns that participated in the study had a written pre-and-post-rotation test [39.4% (13/33) of the study population]. 20 Interns were excluded because of annual leave and being 'post call'.

4.7.2 Results

The Mean, Minimum, Maximum and Standard Deviation for the written tests are shown in [Table 15](#). No significant differences were reflected in the results [$p=0.71$ with 95% CI for difference (-3.4; 2.4)]

Table 1. Demographic information of participants

	Frequency
Gender	
Male	14 (46.2%)
Female	12 (53.8%)
Undergraduate University	
Cape Town	1 (3.9%)
Medunsa	2 (7.7%)
KwaZulu Natal	0 (0%)
Stellenbosch	3 (11.5%)
Free State	16 (61.5%)
Pretoria	3 (11.5%)
Witwatersrandt	1 (3.85%)
Curriculum	
5 year	19 (73.1%)
6 year	7 (26.9%)
Year of Internship	
1 st year	11 (42.3%)
2 nd year	15 (57.7%)
Rotations completed	
Orthopaedics	14 (53.9%)
Surgery	11 (42.3%)
Paediatrics	20 (76.9%)
Internal Medicine	20 (76.9%)
Psychiatry	15 (57.7%)
Family Medicine	15 (57.7%)
Obstetrics and Gynaecology	13 (50.0%)

Note: Total $n = 26$

Table 2. Future career information

	Frequency
Career plans	
Undecided	8 (30.8%)
General Practice	0 (0%)
Medical Officer	1 (3.9%)
Specialist	17 (65.4%)
Specialities	
Paediatrics	6 (35.3%)
Dermatology	3 (17.7%)
Surgery	2 (11.8%)
Internal Medicine	3 (17.7%)
Psychiatry	1 (5.9%)
Plastic Surgery	1 (5.9%)
Radiology	1 (5.9%)

Note: Total $n = 26$

Table 3. Level of confidence in performing CPR

	Frequency
Confidence Level	
Little	1 (3.9%)
Moderate	22 (84.6%)
Very	3 (11.5%)

Note: Total $n = 26$

Table 4. Resuscitation training

	Frequency
Undergraduate Training	
BLS	25 (96.2%)
ACLS	11 (45.8%)
Formal Training	
BLS	8 (30.8%)
1st year	3 (27.3%)
2nd year	5 (33.3%)
ACLS	2 (7.7%)
1st year	1 (9.1%)
2nd year	1 (6.7%)
PALS	0 (0%)
ATLS	0 (0%)

Note: Total $n = 26$

Table 5. Resuscitation exposure and number of events

	Frequency
In Hospital exposure	25 (96.2%)
Number of events	
1 – 5	18 (72.0%)
6 – 10	5 (20.0%)
11 – 15	1 (4.0%)
16 - 20	1 (4.0%)

Note: Total $n = 26$

Table 6. Resuscitation exposure - events per intern year

	Median	Minimum	Maximum
Intern Year			
1st year	4	1	8
2nd year	5	2	20

Table 7. Written Pre-Rotation test results

<i>n</i>	Mean	Standard Deviation	Minimum	Maximum
26	14.4	3.6	5	19

Note: Results out of 25

Table 8. Comparing Pre-Rotation test results of Free State Graduates vs Others

	<i>n</i>	Mean	Standard Deviation	Minimum	Maximum
Free State	16	15.4	2.8	11	19
Others	10	12.7	4.3	5	19

Note: Total *n* = 26; Results out of 25

Table 9. Comparing Pre-Rotation test results of different Intern year groups

	<i>n</i>	Mean	Standard Deviation	Minimum	Maximum
1st year	11	14.5	4	6	19
2nd year	15	14.2	3.5	5	19

Note: Total *n* = 26; Results out of 25

Table 10. Comparing Pre-Rotation results of Interns that completed their Surgery/Family Medicine rotations

	<i>n</i>	Mean	Standard Deviation	Minimum	Maximum
Not Completed	6	14.5	3.4	11	19
Completed	20	14.4	3.8	5	19

Note: Total *n* = 26; Results out of 25

Table 11. Comparing Pre-Rotation written test results of Interns with formal undergraduate resuscitation training vs Interns without

	<i>n</i>	Mean	Standard Deviation	Minimum	Maximum
With Training	11	13.8	4	6	19
Without Training	13	14.5	3.4	5	18

Note: Total *n* = 26; Results out of 25

Table 12. Pre-Rotation evaluation - Cardiac Arrest VF/Pulseless VT

Recognise Cardiac Arrest	25 (96.2%)
Call for help	19 (73.1%)
Call for defibrillator	22 (84.6%)
CPR	26(100%)
hard and fast (5cm and 100/min)	2 (7.8%)
minimum interruptions	11 (42.3%)
2 minutes	12 (46.2%)
Rhythm Analysis	25 (96.2%)
Identify rhythm	21 (84.0%)
less than 10 seconds	13 (50.0%)
Shock	26 (100%)
360J / 200J	16 (61.5%)
immediately when available	15 (57.7%)
Drug Administration	
Adrenaline	20 (76.9%)
1 mg	19 (73.1%)
3-5 minutes	10 (38.5%)
Amiodarone (if appropriate)	22 (84.6%)
300mg bolus	24 (92.3%)
Look for reversible causes / H's & T's	3 (11.5%)
Recognise Return Of Spontaneous Circulation	20 (76.9%)

Note: Total $n = 26$

Table 13. Written Post-Rotation test results

	n	Mean	Standard Deviation	Minimum	Maximum
Post-Rotation	13	14.1	4.3	3	19

Note: Total $n = 13$; Results out of 25

Table 14. Post-Rotation evaluation - Cardiac Arrest PEA/Asystole

Recognise Cardiac Arrest	13 (100%)
Call for help	12 (92.3%)
Call for defibrillator	7 (53.9%)
CPR	13 (100%)
hard and fast (5cm and 100/min)	0 (0%)
minimum interruptions	7 (53.9%)
2 minutes	4 (30.8)
Rhythm Analysis	13 (100%)
Identify rhythm	10 (76.9%)
less than 10 seconds	8 (61.5%)
Shock - DO NOT	8 (61.5%)
Adrenaline	12 (92.3%)
1 mg	12 (92.3%)
3 - 5 minutes	5 (38.5%)
Appropriate Drug use	7 (53.9%)
Look for reversible causes / H's & T's	5 (38.5%)
Recognise Return of Spontaneous Circulation	7 (53.9%)

Note: Total $n = 13$

Table 15. Comparing Pre-and-Post-Rotation written test results

	n	Mean	Standard Deviation	Minimum	Maximum
Pre-Rotation	13	14.6	3.6	5	19
Post-Rotation	13	14.1	4.3	3	19

Note: Total $n = 13$; Results out of 25

Table 16. Comparing Pre-and-Post-Rotation evaluations

	Pre-Rotation	Post-Rotation
Recognise Cardiac Arrest	25 (96.2%)	13 (100%)
Call for help	19 (73.1%)	12 (92.3%)
Call for defibrillator	22 (84.6%)	7 (53.9%)
CPR	26(100%)	13 (100%)
hard and fast (5cm and 100/min)	2 (7.8%)	0 (0%)
minimum interruptions	11 (42.3%)	7 (53.9%)
2 minutes	12 (46.2%)	4 (30.8)
Rhythm Analysis	25 (96.2%)	13 (100%)
Identify rhythm	21 (84.0%)	10 (76.9%)
less than 10 seconds	13 (50.0%)	8 (61.5%)
Adrenaline	20 (76.9%)	12 (92.3%)
1 mg	19 (73.1%)	12 (92.3%)
3 - 5 minutes	10 (38.5%)	5 (38.5%)
Look for reversible causes / H's & T's	3 (11.5%)	5 (38.5%)
Recognise Return of Spontaneous Circulation	20 (76.9%)	7 (53.9%)

Note: Total $n = 26$ (Pre-Rotation); Total $n = 13$ (Post-Rotation)

4.8 Summary of Results

In this chapter the results of the study were presented. The participants did not show a significant improvement in their resuscitation knowledge and skills, as measured by the written test and the skills evaluation during their two-month rotation in the department of anaesthesiology. Detailed discussion shall follow in Chapter 5.

CHAPTER 5

DISCUSSION

Chapter 5 shall include an interpretation of the results of the study, and a discussion of the issues raised by the results. Chapter 5 will also include a discussion of the study in terms of potential limitations of the study, implications for clinical practice and further research. In the previous chapter, the results of the study were presented. The participants showed no significant improvement in their resuscitation knowledge and skills, as measured by the pre-and-post-rotation written test and the skills evaluation during their two-month rotation in the Department of Anaesthesiology.

5.1 Discussion of results pertaining to the aim of the study

This study showed that Intern doctors do not have the necessary knowledge regarding resuscitation. Even though the group averaged above what would classically be assumed to be a passing mark, i.e. 50%, none of the participants scored above 80%, as was set out to be judged satisfactory for this study.

When the results of the written knowledge test and the practical skills assessment were analysed more concerning questions are raised regarding adequacy of the Interns' resuscitation knowledge and preparation for successful resuscitation provision.

The group average in the pre-rotation written test was 58.4% (14.6/25), with the highest score being 76.0% (19/25) and the lowest score being 20.0% (5/25).

In the Practical skills assessment the Intern doctors also scored unsatisfactory. Some of the biggest problem areas identified were the quality of the CPR, with minimal interruptions and adequate time intervals. When looking at the quality of CPR being performed only 2 (7.8%) participants scored a mark, and for minimal interruption and adequate time intervals, only 11 (42.3%) and 12 (46.2%) of the participants scored marks, respectively. Other problem area were keeping rhythm analysis time to below 10 seconds [13 (50.0%)], defibrillating at the correct energy level [16 (61.5%)], and as soon as defibrillator is available [15 (57.7%)], time intervals between Adrenalin doses [10 (38.5%)] and looking for reversible causes / H's & T's [3 (11.5%)].

The group average in the post-rotation written test was 56.4% (14.1/25), with the highest score being 76.0% (19/25) and the lowest score being 12.0% (3/25).

In the Practical skills assessment the Intern doctors still scored unsatisfactory. Some of the biggest problem areas identified were still the quality of the CPR, with minimal interruptions and adequate time intervals. When looking at the quality of CPR being performed, none of the participants scored a mark; and for minimal interruption and adequate time intervals, only 7 (53.9%) and 4 (30.8%) of the participants scored marks, respectively. Only 7 (53.9%) participants called for the defibrillator, even though it was a non-shockable rhythm at the time, these rhythms tend to change expectantly. Other problem area were keeping rhythm analysis time to below 10 seconds [8 (61.5%)], not defibrillating a non-shockable rhythm [8 (61.5%)], time intervals between Adrenalin doses [5 (38.5%)], appropriate drug use [7 (53.9%)], looking for reversible causes / H's & T's [3 (11.5%)] and recognising return of spontaneous circulation [7 (53.9%)].

There was no significant difference in the pre-and-post-rotation results. There was no improvement in the results at the two-month interval, even though participants were encouraged to revise to AHA guidelines on resuscitation.

The written test questions were designed to test resuscitation knowledge with non-threatening simple questions, some of which any intern would be expected to know even without advanced resuscitation training. One would have expected their knowledge to improve such that they scored higher at the two-month follow-up.

The practical skills evaluation were designed to simulate an In-hospital resuscitation; to test the Interns' ability to follow the AHA Cardiac Arrest Algorithm successfully, the quality of their CPR, administration of drugs, use of the defibrillator and their ability to think on their feet. Again, one would have expected their skills to improve at the two-month follow-up evaluation.

The results suggest that this group of Intern doctors remain inadequately prepared for performing adequate CPR, despite the increased exposure to resuscitation training by departments like Surgery and Family Medicine during their internship.

Of concern is the fact that the vast majority (84.6%) of Intern doctors considered themselves moderately confident in performing adequate CPR. However, this is perhaps tempered by the fact that Interns generally work under supervision, but it must be remembered that Intern doctors often perform after hours work without on-site supervision where they will act as first responders to resuscitations.

Resuscitation knowledge appears inadequate in key areas for this group of Intern doctors, and that exposure to resuscitation event and discussions of events alone is not sufficient to address these gaps in knowledge.

5.2 Discussion of results pertaining to secondary factors

5.2.1 Undergraduate training

Undergraduate training may influence the results of the study, and thus may impact on the adequacy of the knowledge obtained and subsequent preparation of resuscitation. From the demographic questionnaire we gathered that some participants did not have any undergraduate resuscitation training. We specifically compared the University of the Free State Graduates results with those of the other universities, because the Department of Anaesthesia have a very well structured, formal advanced resuscitation training program for undergraduates in place. The University of the Free State Graduates scored slightly better [61.6% (15.4/25)], compared to the other universities graduates [50.8% (12.7/25)].

5.2.2 Completed Rotations

The completed rotations during Internship may influence the outcome of the study, and thus may impact on the adequacy of the knowledge obtained and subsequent preparation of resuscitation. Department of Surgery and Family Medicine introduced resuscitation training programs for Interns rotating there. One would expect that participants that have completed these rotations might be more equipped to perform adequate CPR. Though there was no difference in the results between the two groups.

5.2.3 Year of Internship

The year of Internship may influence the outcome of the study, and thus may impact on the adequacy of the knowledge obtained and subsequent preparation of resuscitation. One would expect that second year Interns might be better prepared,

and have more exposure, to perform adequate CPR. Though, there was no difference in the results between the first and second year Interns.

5.3 Discussion of potential limitations of the study

The following were identified as potential limitations of the study:

- Sample size
- Follow-up
- Study period

5.3.1 Sample size

The sample size of the study was very small. Of the potential 33 participants that rotated in the Department of Anaesthesia during the study period, which is already small, we could only manage to include 26 participants. Potential participants were excluded due to being on annual leave or 'post call' on the evaluation days.

5.3.2 Follow-up

Of the 26 participants that was included in the study, only 13 had a pre-and-post-rotation evaluation. Participants were excluded due to being on annual leave or 'post call' on the evaluation days.

5.3.3 Study period

The study ran over a period of 10 months, from March 2014 to December 2014. Due to time constraints it couldn't be extended to include more potential participants.

5.4 Further research and recommendations

Assessing the knowledge of Intern doctors regarding the adequacy of their resuscitation skills remain a valuable and worthwhile objective given that they do not always have the necessary in site supervision and they do act in most departments as the first responders to resuscitation events. And Community Service will follow where they will have no supervision.

I belief this lack of knowledge has now been proven. Improved teaching and ongoing learning should take place. Evaluation of teaching should be evaluated. We should research the training and training methods, and even the trainers, and look at new methods of training. There is also proof that retention of knowledge is an always concerning problem. This research results should be made available to the Heads of

Departments and the Clinical Heads of Hospitals. It is dangerous to have Intern doctors performing cardiopulmonary resuscitation.

Chapter 5 included an interpretation of the results of the study, and a discussion of the issues raised by the results. This chapter also included a discussion of the study in terms of potential limitations of the study and further research paths. A summary of the study and the conclusions shall be presented in Chapter 6.

CHAPTER 6

SUMMARY AND CONCLUSION

Chapter 6 shall include a summary of the study and the conclusions drawn from the study.

6.1 Summary

Intern doctors are often regarded as first responders to attend to patients in emergency situations. But we now see that many Intern doctors are not equipped with the necessary knowledge and skills to carry out effective cardiopulmonary resuscitation.

The goal of this study was to evaluate the adequacy of Intern doctors' resuscitation knowledge and skills while rotating in the Department of Anaesthesia.

After approval from the Research Division of the Ethics Committee of the University of the Free State, 26 Intern doctors were enrolled in the study. They completed a demographic questionnaire, written a multiple choice test, and performed a skills evaluation in a simulation centre; to assess their adequacy of performing effective cardiopulmonary resuscitation. Follow-up evaluation was done at the end of their two-month rotation in the Department of Anaesthesia.

The average result for the pre-rotation written test was 58.4% (14.6/25), while they scored unsatisfactory in the practical skills assessment. The biggest problem areas identified was the quality of the CPR, and the use of a defibrillator. There was no improvement with the follow-up evaluation at the end of their two-month rotation. The resuscitation knowledge and skills of the Intern doctors were rated as unsatisfactory.

6.2 Conclusion

The results of the study are underpowered and no more than suggestions or trends can be concluded from this specific study, but have shown potential for further research into certain areas as discussed in Chapter 5.

The following conclusions can be drawn from the study:

- 1) Intern doctors are not equipped to provide adequate cardiopulmonary resuscitation.

- 2) The undergraduate resuscitation training programs that are currently in place are not adequate to equip Intern doctor with the necessary knowledge and skills to provide adequate cardiopulmonary resuscitation.
- 3) Active advanced life support training programs should be initiated to help provide Interns with the necessary knowledge and skills to provide adequate cardiopulmonary resuscitation.
- 4) Current resuscitation training programs need to be seriously re-evaluated, and aimed at improving Interns knowledge and skills.
- 5) All relevant Heads of Departments, and Clinical Heads of Hospitals should be informed.
- 6) Attitudes of the Intern doctors towards the subject of Cardiopulmonary resuscitation should be tested.

The results of this study have provided useful information, which can be directly applied in the clinical setting, with the aim of improving the training programs to equip Intern doctors to provide adequate cardiopulmonary resuscitation.

CHAPTER 7

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APPENDICES

Appendix A: Ethics approval



Research Division
Internal Post Box G40
☎ (051) 4052812
Fax (051) 4444359

E-mail address: StraussHS@ufs.ac.za

Ms H Strauss/jdpls

2014-03-06

REC Reference nr 230408-011
IRB nr 00006240

DR J GELDENHUYS
DEPT OF ANAESTHESIOLOGY
FACULTY OF HEALTH SCIENCES
UFS

Dear Dr Geldenhuys

ECUFS NR 18/2014


PROJECT TITLE: THE RESUSCITATION KNOWLEDGE AND SKILLS OF INTERN DOCTORS WORKING IN THE DEPARTMENT OF ANAESTHESIA AT THE BLOEMFONTEIN ACADEMIC HOSPITAL COMPLEX.

1. You are hereby kindly informed that at the meeting held on 4 March 2014 the Ethics Committee approved the study after all the conditions have been met after the approval letter from the Biostatistician was submitted.
2. Committee guidance documents: Declaration of Helsinki, ICH, GCP and MRC Guidelines on Bio Medical Research. Clinical Trial Guidelines 2000 Department of Health RSA; Ethics in Health Research: Principles Structure and Processes Department of Health RSA 2004; Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa, Second Edition (2006); the Constitution of the Ethics Committee of the Faculty of Health Sciences and the Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines.
3. Any amendment, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.
4. The Committee must be informed of any serious adverse event and/or termination of the study.
5. All relevant documents e.g. signed permission letters from the authorities, institutions, changes to the protocol, questionnaires etc. have to be submitted to the Ethics Committee before the study may be conducted (if applicable).
6. A progress report should be submitted within one year of approval of long term studies and a final report at completion of both short term and long term studies.



7. Kindly refer to the ETOVS/ECUFS reference number in correspondence to the Ethics Committee secretariat.

Yours faithfully



.....
PROF WH KRUGER
CHAIR: ETHICS COMMITTEE

Appendix B: Permission from Department of Anaesthesiology

25 February 2014

Prof BJS Diedericks
Head of Department
Department of Anaesthesiology
University of the Free State
Bloemfontein

RE: Participation of Intern Doctors in post-graduate research study (Ecufs nr 18/2014)

I would hereby request consent for the participation of Intern doctors rotating in the Department of Anaesthesia during the period of February 2014 to February 2015 in a research study.

The study is aimed at determining their resuscitation knowledge and skills at the time of their Anaesthesia rotation. Participation will be voluntary and information obtained would be used for research and publication purposes in a confidential manner.

Evaluation will consist of a questionnaire regarding participants' background information, a computer-based multiple choice test and a practical cardiopulmonary resuscitation session in the simulation centre. This will all be based on the latest American Heart Associations' guidelines on resuscitation.

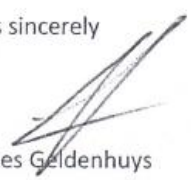
I hope to use the information obtained from the study to make Heads of Department aware of the results and motivate for introduction of formal resuscitation training to all junior personnel.

Intern Doctors will be evaluated twice during their rotation in the Department of Anaesthesia. I would like permission to be excused, together with the Intern group, on the first and last Friday of the Intern rotation for an hour or two from our normal duties in order to complete these evaluations.

I trust you will find everything in order and consent for the participation of the Interns.

Thank you.

Yours sincerely



Jacques Geldenhuys
Registrar Anaesthesiology

I hereby give consent for the above study.



Prof BJS Diedericks
Head of Department: Anaesthesiology

Appendix C: Permission from Clinical Simulation Unit

28 March 2014

Dr J Geldenhuys
Registrar Anaesthesiology

Dear dr Geldenhuys,

RE: The resuscitation knowledge and skills of Intern Doctors working in the Department of Anaesthesia at the Bloemfontein Academic Hospital Complex

With regard to your study to test the resuscitation skills of the Intern Doctors, I give my permission to use the Clinical Simulation Unit for Post Graduate research purposes.

Regards



Dr M J Labuschagne
Clinical Simulation Unit, School of Medicine, UFS
A200 Francois Retief Building
UFS

LabuschagneMJ@ufs.ac.za

Appendix D: Permission from Hospital



pelonomi hospital

Department of Health
Pelonomi Tertiary Hospital
FREE STATE PROVINCE

INTERNAL MEMO

DATE:	28 March 2014	Enquiries
TO:	Dr Geldenhuys J Anaesthesiology Department Faculty of Health Sciences UFS Bloemfontein	FROM: Dr Benganga B.A Head: Clinical Services Pelonomi Regional Hospital Bloemfontein

**REQUEST: THE RESCUSCITATION KNOWLEDGE AND SKILLS OF INTERN DOCTORS
WORKING IN THE DEPARTMENT OF ANAESTHESIA AT THE BLOEMFONTEIN
ACADEMIC HOSPITAL COMPLEX**

Pelonomi Tertiary Hospital grants you permission to conduct researches/studies/project when the following criteria are met.

- ☒ That you obtain Ethical Clearance from the Human Research Ethics Committee of the relevant University.
- ☒ That the Hospital incurs no cost in the course of your research.
- ☒ That access to the staff and patients at the Pelonomi Hospital will not interrupt the daily provision of services.
- ☒ That prior to conducting the research you will liaise with the supervisors of the relevant sections and introduce yourself with permission letter and to make arrangements with them in a manner that is convenient to the sections.

Yours Sincerely

Dr Benganga B.A
Director: Clinical Services



Appendix E: Participant information document

INFORMATION DOCUMENT

Resuscitation knowledge and skills of Intern Doctors

Dear Intern Doctor

I am conducting a postgraduate research study on the resuscitation knowledge and skills of Intern Doctors rotating through the Department of Anaesthesia.

You are hereby invited to participate in the study.

Your participation in the study would entail completing an information form regarding demographic information, resuscitation training and career plans; complete a Computer Based Multiple Choice Test on resuscitation guidelines and a practical CPR skills test on a manikin.

The test shall be completed under examination conditions without consultation between participants or the use of reference material.

Participation is **voluntary**.

Participation or non-participation shall not benefit or disadvantage participants in any way.

Participants may discontinue participation at any time without disadvantage in any way.

Consent will include participation in the study, but also the use of the information obtained for research and publication purposes.

Efforts will be made to keep personal information confidential.

Contact details of researcher: Jacques Geldenhuys, Department of Anaesthesia – for further information: Telephone number 0835606646 (#6649)

Contact details of Secretariat and Chair: Ethics Committee of the Faculty of Health Sciences, University of the Free State – for reporting of complaints/problems: Telephone number (051) 4052812

Appendix F: Participant consent form

CONSENT TO PARTICIPATE IN RESEARCH

Resuscitation knowledge and skills of Intern Doctors

You have been asked to participate in a research study.

You have been informed about the study by _____ .

I have been informed that the information and results obtained from this study will be handled confidentially by the researcher.

You may contact **Jacques Geldenhuys** at 0835606646 (#6649) any time if you have questions about the research.

You may contact the Secretariat of the Ethics Committee of the Faculty of Health Sciences, University of the Free State at telephone number (051) 4052812 if you have questions about your rights as a research subject.

The researcher confirmed the approval for this study by the Ethics committee of the University of the Free State and the Chief Executive Officer, as well as the Intern Co-ordinator of Pelonomi Regional Hospital.

Your participation in this research is voluntary, and you will not be penalised or lose benefits if you refuse to participate or decide to terminate participation.

If you agree to participate, you will be given a signed copy of this document as well as the participant information sheet, which is a written summary of the research.

The research study, including the above information has been verbally described to me. I understand what my involvement in the study means and I voluntarily agree to participate.

I agree that the information and results obtained from the study may be used for research and publication purposes.

Name of Participant

Signature of Participant

Date

Appendix F: Demographic data sheet

The following forms must be completed by each intern prior to the pre-rotation test.
Indicate your choice with X in the block provided.

Demographic information:

Number allocated to student, 01 – 50

 1-2

Please indicate your gender.

 F M 3

University – where pre graduated training was completed

 4

Cape Town	<input type="text"/>
Medunsa	<input type="text"/>
Natal	<input type="text"/>
Stellenbosch	<input type="text"/>
UFS	<input type="text"/>
UNITRA	<input type="text"/>
UP	<input type="text"/>
WITS	<input type="text"/>
Other	<input type="text"/>

Did you follow a 5 or 6 year undergraduate, curriculum?

 5

5 year

6 year

Are you in your 1st or 2nd year of internship?

 6 1 2

Which rotations have you finished?

Orthopaedics ☐

Surgery ☐

Paediatrics ☐

Internal Medicine ☐

Psychiatry ☐

Family Medicine ☐

Obstetrics and Gynaecology ☐

None ☐

☐ 7

☐ 8

☐ 9

☐ 10

☐ 11

☐ 12

☐ 13

☐ 14

Your present age in years

 15-16

Future career information:

What are your future career plans after completing internship and community service.

Please mark ONE only.

Undecided ☐

General Practitioner ☐

Hospital Medical Officer ☐ In which department? _____

Specialist Training ☐ Which speciality? _____

Other ☐ Please specify _____

☐ 17

☐ 18

☐ 19-20

☐ 21-22

☐ 23-24

Resuscitation training and exposure information:

1. How confident are you in performing CPR and ALS in an actual respiratory/cardiac arrest situation?

☐ 25

On a scale of 1 – 3 with

1 very little confidence ☐

2 moderate confidence ☐

3 very confident ☐

2. Have you had any formal basic life support training during your pre-graduate training?

☐ Y ☐ N

If yes, which department was responsible for this training?

☐ 26

☐ ☐ 27-28

3. Have you had any formal advanced life support training during your pre-graduate training?

☐ Y ☐ N

If yes, which Department was responsible for this training?

☐ 29

☐ ☐ 30-31

4. Have you had any airway management training during your pre-graduate training?

☐ Y ☐ N

If yes, which department was responsible for this training?

☐ 32

☐ ☐ 33-34

5. Have you had any previous hands on exposure to resuscitation, out of hospital?

☐ Y ☐ N

If yes, record the number of events _____

☐ 35

☐ ☐ 36-37

6. Clinical exposure to resuscitation in hospital?

☐ Y ☐ N

If yes, record the number of events _____

☐ 38

☐ ☐ 39-40

7. Have you had formal BLS, ATLS, ACLS, PALS training?

Course	Yes	No	When? (Year)	Where? (City)
BLS				
ACLS				
ATLS				
PALS				

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	41-44
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	45-48
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	49-52
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	53-56

8. Have you done any self-study on the “new” 2010 AHA resuscitation guidelines?

<input type="checkbox"/> Y	<input type="checkbox"/> N
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<input type="checkbox"/>	57
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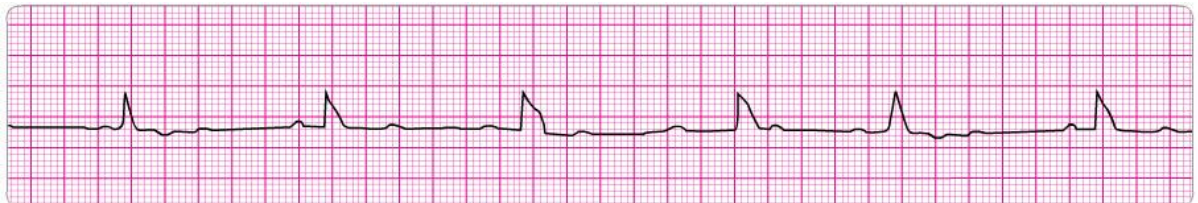
Appendix G: Written multiple choice tests

Resuscitation Knowledge Test 1

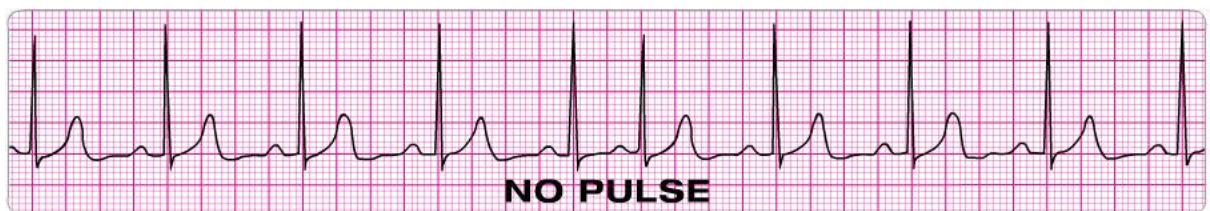
For each of the following rhythm 1 -5 please choose the appropriate answer from the list below:

- a) Normal Sinus Rhythm
- b) Sinus Tachycardia
- c) Supraventricular Tachycardia
- d) Fine Ventricular Fibrillation
- e) Monomorphic Ventricular Tachycardia
- f) 2nd degree I Block
- g) 2nd degree II Block
- h) 3rd degree block
- i) Sinus Bradycardia
- j) Atrial Flutter
- k) Atrial Fibrillation
- l) Coarse Ventricular Fibrillation
- m) Polymorphic Ventricular Tachycardia/Torsades
- n) Agonal rhythm/asystole
- o) Pulseless Electrical Activity

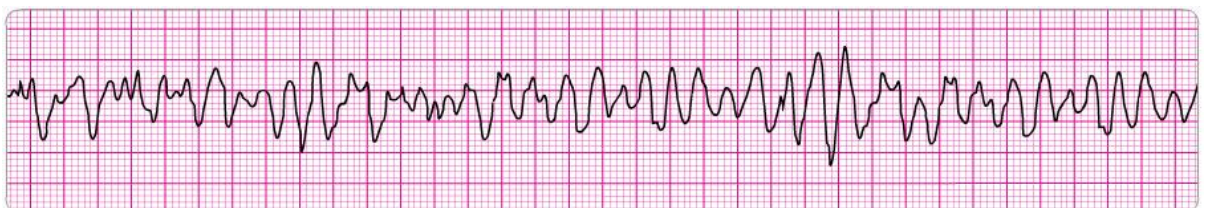
1.



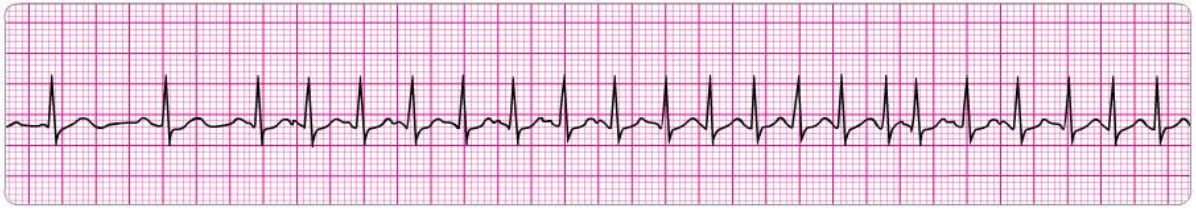
2.



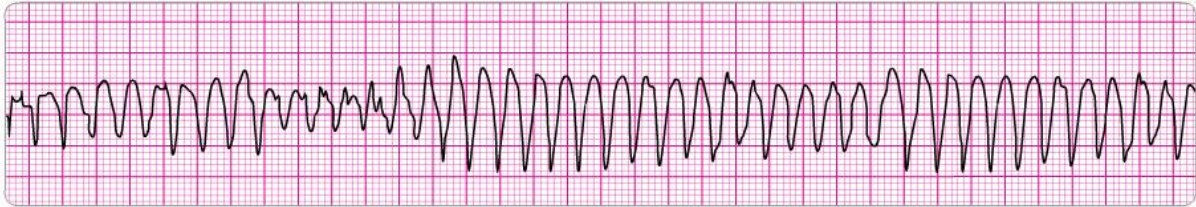
3.



4.



5.



6. Which of the following statements about the use of magnesium in cardiac arrest is most accurate?

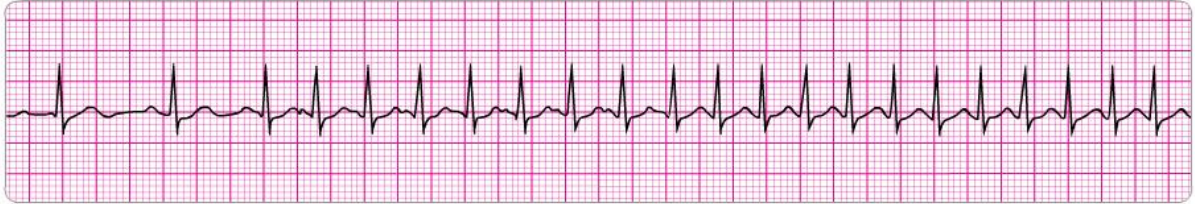
- a) Magnesium is indicated for shock-refractory monomorphic VT.
- b) Magnesium is indicated for VF/pulseless VT associated with torsades de pointes.
- c) Magnesium is contraindicated for VT associated with a normal QT interval.
- d) Magnesium is indicated for VF refractory to shock and amiodarone or lignocaine.

7. A patient is in cardiac arrest. Ventricular fibrillation has been refractory to a third shock. Of the following, which drug and dose should be administered first by the IV/IO route?

- a) Adrenaline 1 mg
- b) Vasopressin 20 units
- c) Sodium bicarbonate 50 mEq
- d) Atropine 1 mg

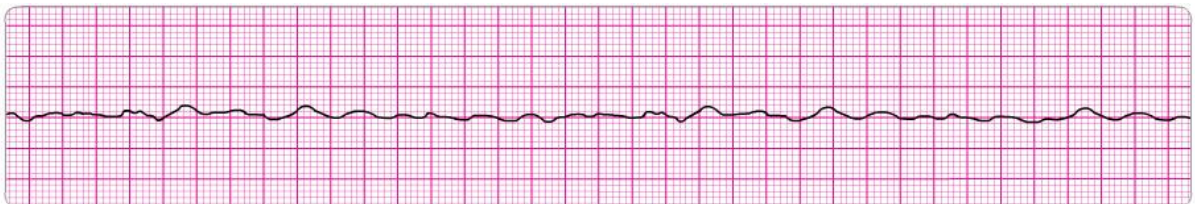
- 8. A 35-year-old woman has palpitations, light-headedness, and a stable tachycardia. The monitor shows a regular narrow-complex QRS at a rate of 180/min. Vagal maneuvers have not been effective in terminating the rhythm. An IV has been established. What drug should be administered IV?**
- a) Lignocaine 1mg/kg
 - b) Adenosine 6 mg
 - c) Adrenaline 2 to 10 mcg/kg per minute
 - d) Atropine 0.5 mg
- 9. A patient is in refractory ventricular fibrillation and has received multiple appropriate defibrillation shocks, adrenaline 1 mg IV twice, and an initial dose of 300 mg amiodarone IV. The patient is intubated. A second dose of amiodarone is now called for. The recommended second dose of amiodarone is:**
- a) An endotracheal dose of 2 to 4 mg/kg.
 - b) 300 mg IV push.
 - c) 1 mg/kg IV push.
 - d) An infusion of 1 to 2 mg/min.
 - e) 150 mg IV push.
- 10. A 57-year-old woman has palpitations, chest discomfort, and tachycardia. The monitor shows a regular wide-complex QRS at a rate of 180/min. She becomes diaphoretic, and her blood pressure is 80/60 mm Hg. The next action is to:**
- a) Give amiodarone 300 mg IV push.
 - b) Perform immediate electrical cardioversion.
 - c) Establish IV access.
 - d) Obtain a 12-lead ECG.

11. A 45-year-old woman with a history of palpitations develops light-headedness and palpitations. She has received adenosine 6 mg IV for the rhythm shown above without conversion of the rhythm. She is now extremely apprehensive. Blood pressure is 108/70 mm Hg. What is the next appropriate intervention?



- a) Repeat adenosine 3 mg IV.
- b) Perform immediate unsynchronized cardioversion.
- c) Sedate and perform synchronized cardioversion.
- d) Repeat adenosine 12 mg IV.
- e) Perform vagal maneuvers and repeat adenosine 6 mg IV.

12. Following initiation of CPR and 1 shock for VF, this rhythm is present on the next rhythm check. A second shock is given and chest compressions are resumed immediately. An IV is in place and no drugs have been given. Bag-mask ventilations are producing visible chest rise. What is your next order?



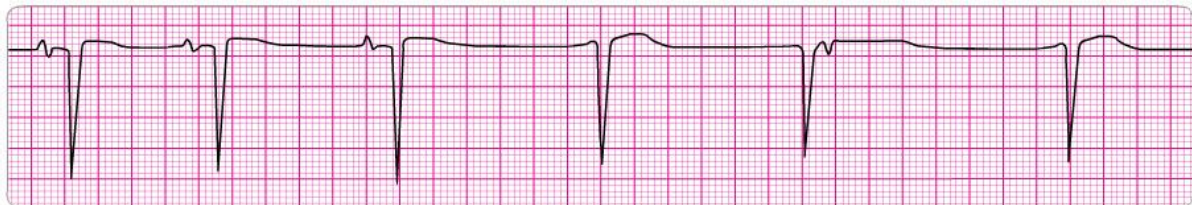
- a) Administer 3 sequential (stacked) shocks at 360 J (monophasic defibrillator).
- b) Prepare to give amiodarone 300 mg IV.
- c) Administer 3 sequential (stacked) shocks at 200 J (biphasic defibrillator).
- d) Perform endotracheal intubation; administer 100% oxygen.
- e) Prepare to give adrenaline 1 mg IV.

13. You arrive on the scene to find a 56-year-old diabetic woman with dizziness. She is pale and diaphoretic. Her blood pressure is 80/60 mm Hg. The cardiac monitor documents the rhythm below. She is receiving oxygen at 4 L/min by nasal cannula and an IV has been established. Your next order is:



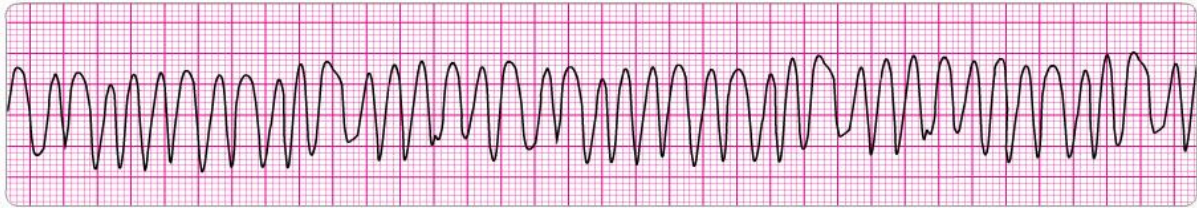
- a) Dopamine at 2 to 10 mcg/kg per minute.
- b) Sublingual nitroglycerin 0.4 mg.
- c) Morphine sulphate 4 mg IV.
- d) Atropine 0.5 mg IV.
- e) Atropine 1 mg IV.

14. A patient becomes unresponsive. You are uncertain if a faint pulse is present with the rhythm below. What is your next action?



- a) Order transcutaneous pacing.
- b) Begin CPR, starting with high-quality chest compressions.
- c) Start an IV and give adrenaline 1 mg IV.
- d) Consider causes of pulseless electrical activity.
- e) Start an IV and give atropine 1 mg.

15. This patient has been resuscitated from cardiac arrest. During the resuscitation, amiodarone 300 mg was administered. The patient developed severe chest discomfort with diaphoresis. He is now unresponsive. What is the next indicated action?



- a) Perform immediate synchronized cardioversion.
 - b) Repeat amiodarone 150 mg IV.
 - c) Give an immediate unsynchronized high-energy shock (defibrillation dose).
 - d) Repeat amiodarone 300 mg IV.
 - e) Give lignocaine 1 to 1.5 mg/kg IV.
- 16. When a child has a heart rate greater than 60 per minute and a pulse but is not breathing effectively, the rescuer should?**
- a) Give breaths without chest compressions.
 - b) Give chest compressions without breaths.
 - c) Give breaths and chest compressions.
 - d) Connect the AED to the child and analyse.
- 17. Which of the following options lists the correct compression and ventilation rates for 2- rescuer CPR in the presence of an advanced airway?**
- a) Compress at a rate of at least 100 per minute, 2 breaths every 5 to 10 seconds.
 - b) Compress at a rate of at least 60 per minute, 1 breath every 5 to 10 seconds.
 - c) Compress at a rate of at least 60 per minute, 1 breath every 6 to 8 seconds.
 - d) Compress at a rate of at least 100 per minute, 1 breath every 6 to 8 seconds.

18. The compression-to-ventilation ratio for 1-rescuer adult CPR is

- a) 15:2
- b) 20:2
- c) 30:2
- d) 5:1

19. If a victim of foreign body airway obstruction becomes unresponsive, the rescuer should send someone to activate the emergency response system and immediately

- a) Start CPR beginning with compressions
- b) Call the victim's doctor
- c) Performs blind finger sweeps
- d) Perform abdominal thrusts

20. After you identify an unresponsive victim with no breathing (or no normal breathing), what would be your first next step?

- a) Feel for central pulse
- b) Start with Chest compressions
- c) Give a rescue breath
- d) Find an AED

21. You are called to help resuscitate an infant with severe symptomatic bradycardia associated with respiratory distress. The bradycardia persists despite establishment of an effective airway, oxygenation, and ventilation. There is no heart block present. Which of the following is the *first drug* you should administer?

- a) Atropine
- b) Dopamine
- c) Adenosine
- d) Adrenaline

22. A 3-year-old unresponsive, apnoeic child is brought to the emergency department. EMS personnel report that the child became unresponsive as they arrived at the hospital. The child is receiving CPR, including bag-mask ventilation with 100% oxygen and chest compressions at a rate of 100/min. Compressions and ventilations are being coordinated at a ratio of 15:2. You confirm that apnoea is present and that ventilation is producing bilateral breath sounds and chest expansion while a colleague confirms absent pulses. Cardiac monitor shows the following rhythm:



A biphasic manual defibrillator is present. You quickly use the crown-heel length of the child on a length-based, colour-coded resuscitation tape to estimate the approximate weight as 15 kg. Which of the following therapies is most appropriate for this child at this time?

- a) Establish IV/IO access and administer amiodarone 5 mg/kg IV/IO
- b) Establish IV/IO access and administer lidocaine 1 mg/kg IV/IO
- c) Attempt defibrillation at 30 J, then resume CPR beginning with compressions
- d) Establish IV/IO access and administer adrenaline 0.01 mg/kg (0.1 mL/kg of 1:10,000 dilution) IV/IO

23. A 7-year-old boy is found unresponsive, apnoeic, and pulseless. CPR is ongoing.

The child is intubated and vascular access is established. The ECG monitor reveals an organized rhythm, but a pulse check reveals no palpable pulses. Effective ventilations and compressions are resumed, and an initial IV dose of adrenaline is administered. Which of the following therapies should you perform next?

- a) Attempt to identify and treat reversible causes (using the H's and T's)
- b) Attempt defibrillation at 4 J/kg
- c) Administer adrenaline 0.1 mg/kg IV (0.1 mL/kg of 1:1,000 dilution)
- d) Administer synchronized cardioversion at 1 J/kg

24. A 4-year-old male is in pulseless arrest in the paediatric intensive care unit. A code is in progress. As the on-call physician you quickly review his chart and find that his baseline corrected QT interval on a 12-lead ECG is prolonged. A glance at the monitor shows recurrent episodes of the following rhythm:



The boy has received one dose of adrenaline 0.01 mg/kg (0.1 mL/kg of 1:10,000 dilution) but continues to demonstrate the rhythm illustrated above. If this rhythm persists at the next rhythm check, which medication would be *most* appropriate to administer at this time?

- a) Adenosine 0.1 mg/kg IV
- b) Adrenaline 0.1 mg/kg (0.1 mL/kg of 1:1,000 dilution) IV
- c) Lidocaine 1 mg/kg IV
- d) Magnesium sulphate 50 mg/kg IV

25. Identify the following rhythm: (clinical clue: heart rate 150/min)

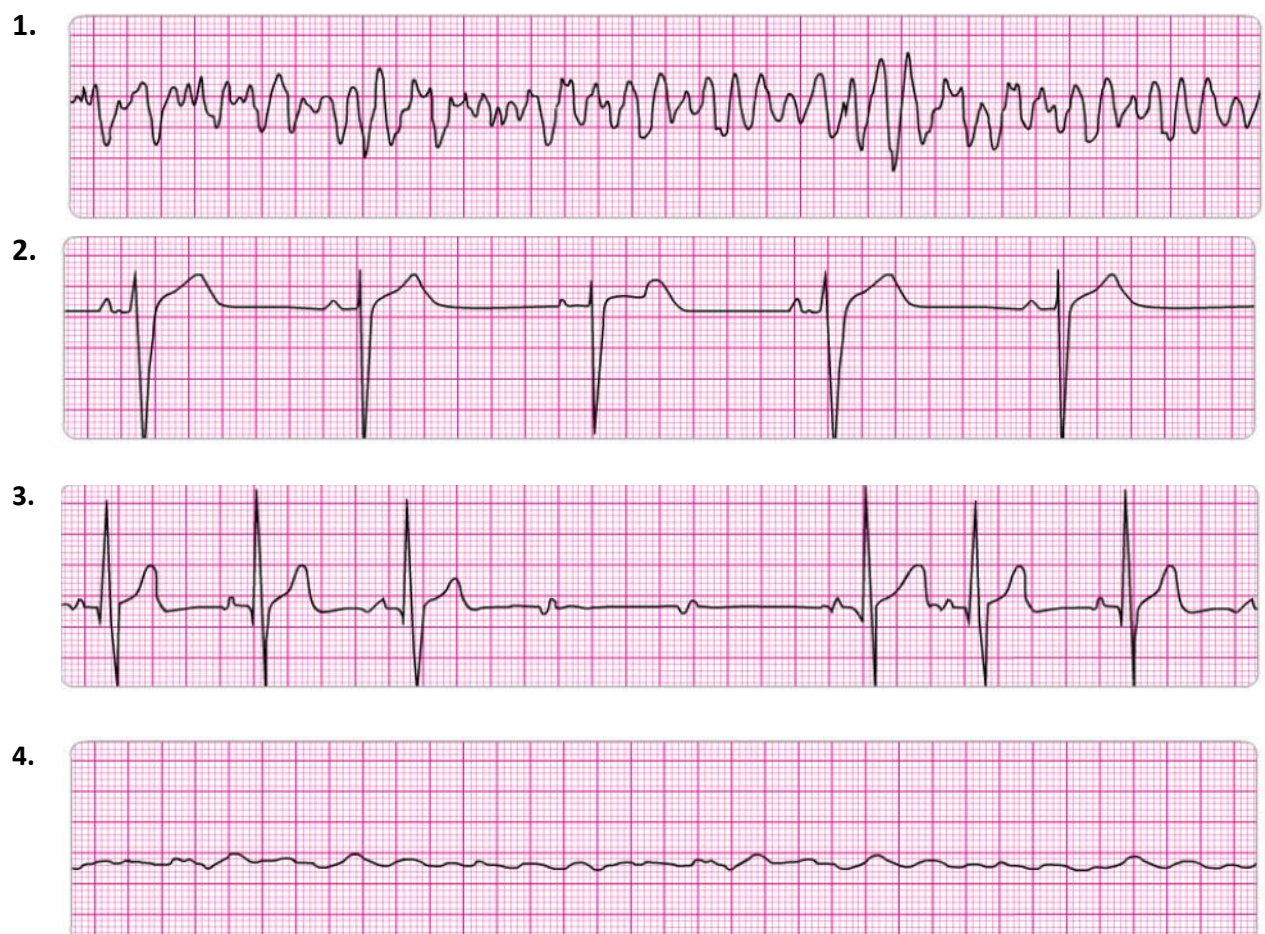


- a) SVT converting to sinus rhythm with adenosine administration
- b) Wide-complex tachycardia (in a child with known aberrant intraventricular conduction; this is SVT with aberrant conduction)
- c) First-degree AV block
- d) Torsades de pointes (polymorphic ventricular tachycardia)
- e) VF converted to organized rhythm after successful shock delivery (defibrillation)

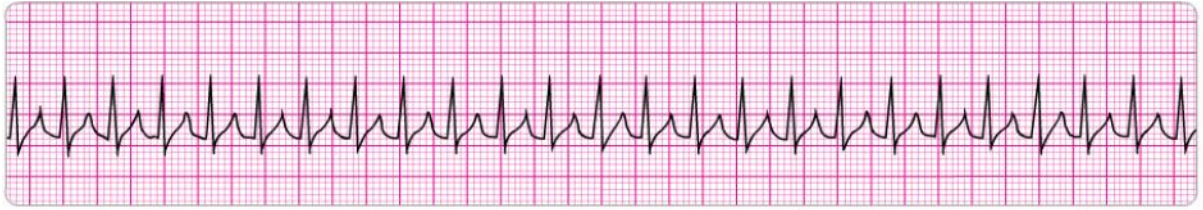
Resuscitation Knowledge Test 2

For each of the following rhythm 1 -5 please choose the appropriate answer from the list below:

- a) Normal Sinus Rhythm
- b) Sinus Tachycardia
- c) Supraventricular Tachycardia
- d) Fine Ventricular Fibrillation
- e) Monomorphic Ventricular Tachycardia
- f) 2nd degree I Block
- g) 2nd degree II Block
- h) 3rd degree block
- i) Sinus Bradycardia
- j) Atrial Flutter
- k) Atrial Fibrillation
- l) Coarse Ventricular Fibrillation
- m) Polymorphic Ventricular Tachycardia/Torsades
- n) Agonal rhythm/asystole
- o) Pulseless Electrical Activity



5.



6. A patient with ST-segment elevation MI has ongoing chest discomfort. Fibrinolytic therapy has been ordered. Heparin 4000 units IV bolus was administered, and a heparin infusion of 1000 units per hour is being administered. Aspirin was not taken by the patient because he had a history of gastritis treated 5 years ago. Your next action is to:

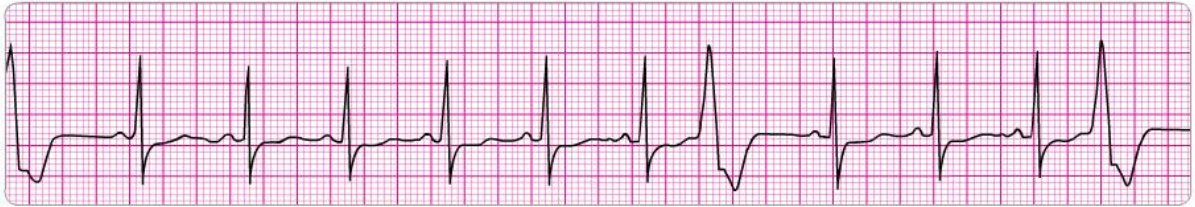
- a) Give aspirin 160 to 325 mg chewed immediately.
- b) Give 75 mg enteric-coated aspirin orally.
- c) Give 325 mg enteric-coated aspirin rectally.
- d) Substitute clopidogrel 300 mg loading dose.

7. A patient has sinus bradycardia with a heart rate of 36/min. Atropine has been administered to a total of 3 mg. A transcutaneous pacemaker has failed to capture. The patient is confused, and her blood pressure is 110/60 mm Hg. Which of the following is now indicated?

- a) Give additional 1 mg atropine.
- b) Start dopamine 10 to 20 mcg/kg per minute.
- c) Give normal saline bolus 250 mL to 500 mL.
- d) Start adrenaline 2 to 10 mcg/min.

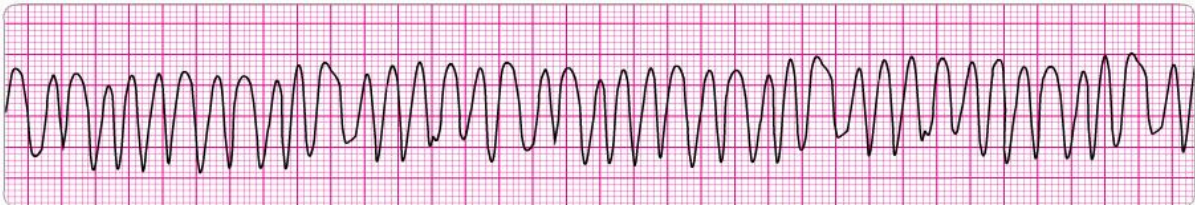
- 8. A 35-year-old woman has palpitations, light-headedness, and a stable tachycardia. The monitor shows a regular narrow-complex QRS at a rate of 180/min. Vagal maneuvers have not been effective in terminating the rhythm. An IV has been established. What drug should be administered IV?**
- a) Lignocaine 1mg/kg
 - b) Adenosine 6 mg
 - c) Adrenaline 2 to 10 mcg/kg per minute
 - d) Atropine 0.5 mg
- 9. A patient is in refractory ventricular fibrillation and has received multiple appropriate defibrillation shocks, adrenaline 1 mg IV twice, and an initial dose of 300 mg amiodarone IV. The patient is intubated. A second dose of amiodarone is now called for. The recommended second dose of amiodarone is:**
- a) An endotracheal dose of 2 to 4 mg/kg.
 - b) 300 mg IV push.
 - c) 1 mg/kg IV push.
 - d) An infusion of 1 to 2 mg/min.
 - e) 150 mg IV push.
- 10. You arrive on the scene with the code team. High-quality CPR is in progress. An AED has previously advised "no shock indicated." A rhythm check now finds asystole. After resuming high-quality compressions, your next action is to:**
- a) Gain IV or IO access.
 - b) Place an oesophageal-tracheal tube or laryngeal mask airway.
 - c) Attempt endotracheal intubation with minimal interruptions in CPR.
 - d) Call for a pulse check.

11. A patient in the emergency department develops recurrent chest discomfort (8/10) suspicious for ischemia. His monitored rhythm becomes irregular as seen above. Oxygen is being administered by nasal cannula at 4 L/min, and an IV line is in place. Blood pressure is 160/96 mm Hg. There are no allergies or contraindications to any medication. You would first order:



- a) Sublingual nitroglycerin 0.4 mg.
- b) Morphine sulphate 2 to 4 mg IV.
- c) Lignocaine 1 mg/kg IV and infusion 2 mg/min.
- d) Amiodarone 150 mg IV.
- e) IV nitroglycerin initiated at 10 mcg/min and titrated to patient response.

12. This patient has been resuscitated from cardiac arrest. During the resuscitation, amiodarone 300 mg was administered. The patient developed severe chest discomfort with diaphoresis. He is now unresponsive. What is the next indicated action?



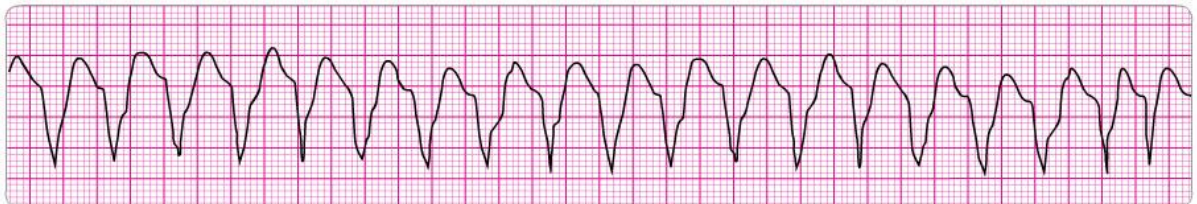
- a) Perform immediate synchronized cardioversion.
- b) Repeat amiodarone 150 mg IV.
- c) Give an immediate unsynchronized high-energy shock (defibrillation dose).
- d) Repeat amiodarone 300 mg IV.
- e) Give lignocaine 1 to 1.5 mg/kg IV.

13. You arrive on the scene to find CPR in progress. Nursing staff report that the patient was recovering from a pulmonary embolism and suddenly collapsed. There is no pulse or spontaneous respirations. High-quality CPR and effective bag-mask ventilation are being provided. An IV has been initiated. What would you do now?



- a) Give atropine 1 mg IV.
- b) Give atropine 0.5 mg IV
- c) Order immediate endotracheal intubation.
- d) Give adrenaline 1 mg IV.
- e) Initiate transcutaneous pacing.

14. You are monitoring a patient. He suddenly has the persistent rhythm shown below. You ask about symptoms and he reports that he has mild palpitations, but otherwise he is clinically stable with unchanged vital signs. What is your next action?



- a) Give an immediate synchronized shock.
- b) Give sedation and perform synchronized cardioversion.
- c) Administer magnesium sulphate 1 to 2 g IV diluted in 10 mL D5W given over 5 to 20 minutes.
- d) Give an immediate unsynchronized shock.
- e) Administer adenosine 6 mg; seek expert consultation.

15. A patient was in refractory ventricular fibrillation. A third shock has just been administered. Your team looks to you for instructions. Your immediate next order is:



- a) Perform endotracheal intubation.
- b) Resume high-quality chest compressions.
- c) Check the carotid pulse.
- d) Give atropine 1 mg IV.
- e) Give amiodarone 300 mg IV.

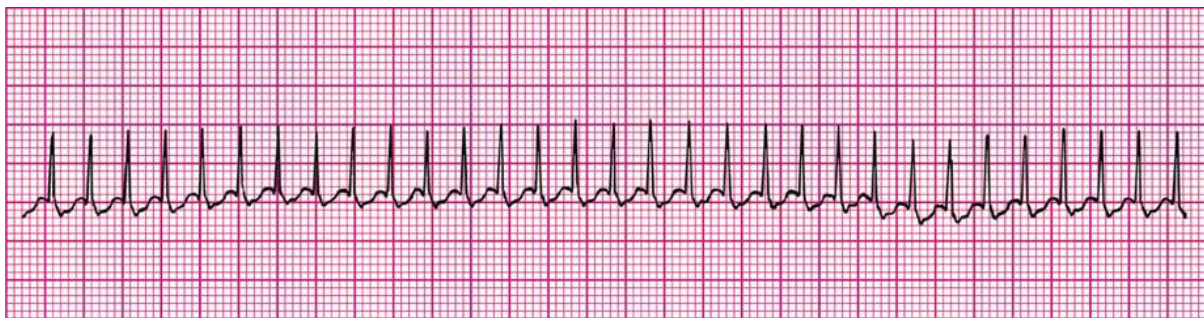
16. Which of the following most reliably delivers a high (90% or greater) concentration of inspired oxygen in a toddler or older child?

- a) Nasal cannula with 4 L/min oxygen flow
- b) Simple oxygen mask with 15 L/min oxygen flow
- c) Non-rebreathing face mask with 12 L/min oxygen flow
- d) Face tent with 15 L/min oxygen flow

17. Which of the following statements most accurately reflects the PALS recommendations for the use of magnesium sulphate in the treatment of cardiac arrest?

- a) Magnesium Sulphate is indicated for VF refractory to repeated shocks and amiodarone or lidocaine
- b) Routine use of magnesium Sulphate is indicated for shock-refractory monomorphic VT
- c) Magnesium Sulphate is indicated for torsades de pointes or suspected hypomagnesaemia
- d) Magnesium Sulphate is contraindicated in VT associated with an abnormal QT interval during the preceding sinus rhythm

18. A 1-year-old male is brought to the emergency department for evaluation of poor feeding, fussiness, and sweating. On general assessment he is lethargic but arousable and has labored breathing and a dusky colour. Primary assessment reveals a respiratory rate of 68/min, heart rate 300/min that does not vary with activity or sleep, blood pressure 70/45 mm Hg, weak brachial pulses and absent radial pulses, capillary refill 6 seconds, SpO2 85% in room air, and good bilateral breath sounds. You administer high-flow oxygen and place the child on a cardiac monitor. You see the following rhythm with little beat-to-beat variability of the heart rate:



Secondary assessment reveals no history of congenital heart disease. IV access has been established. Which of the following therapies is most appropriate for this infant?

- a) Make an appointment with a paediatric cardiologist for later in the week
- b) Adenosine 0.1 mg/kg IV rapidly; if adenosine is not immediately available, perform synchronized cardioversion
- c) Perform immediate defibrillation without waiting for IV access
- d) Establish IV access and administer a fluid bolus of 20 mL/kg isotonic crystalloid

19. A 7-year-old boy is found unresponsive, apnoeic, and pulseless. CPR is ongoing. The child is intubated and vascular access is established. The ECG monitor reveals an organized rhythm, but a pulse check reveals no palpable pulses. Effective ventilations and compressions are resumed, and an initial IV dose of adrenaline is administered. Which of the following therapies should you perform next?

- a) Attempt to identify and treat reversible causes (using the H's and T's)
- b) Attempt defibrillation at 4 J/kg
- c) Administer adrenaline 0.1 mg/kg IV (0.1 mL/kg of 1:1,000 dilution)
- d) Administer synchronized cardioversion at 1 J/kg

20. You are participating in the elective intubation of a 4-year-old child with respiratory failure. You must select the appropriate sized uncuffed endotracheal tube. You do not have a colour-coded, length-based tape to use to estimate correct endotracheal tube size. Which of the following is the most appropriate estimated size uncuffed endotracheal tube for an average 4-year-old?

- a) 3-mm tube
- b) 4-mm tube
- c) 5-mm tube
- d) 6-mm tube

21. After you identify an unresponsive victim with no breathing (or no normal breathing), what would be your first next step?

- a) Feel for central pulse
- b) Start with Chest compressions
- c) Give a rescue breath
- d) Find an AED

22. The compression-to-ventilation ratio for 1-rescuer adult CPR is

- a) 15:2
- b) 20:2
- c) 30:2
- d) 5:1

23. Which of the following options lists the correct compression and ventilation rates for 2- rescuer CPR in the presence of an advanced airway?

- a) Compress at a rate of at least 100 per minute, 2 breaths every 5 to 10 seconds.
- b) Compress at a rate of at least 60 per minute, 1 breath every 5 to 10 seconds.
- c) Compress at a rate of at least 60 per minute, 1 breath every 6 to 8 seconds.
- d) Compress at a rate of at least 100 per minute, 1 breath every 6 to 8 seconds.

24. When a child has a heart rate greater than 60 per minute and a pulse but is not breathing effectively, the rescuer should?

- a) Give breaths without chest compressions.
- b) Give chest compressions without breaths.
- c) Give breaths and chest compressions.
- d) Connect the AED to the child and analyse.

25. If an AED is used for a child less than 8 years of age,

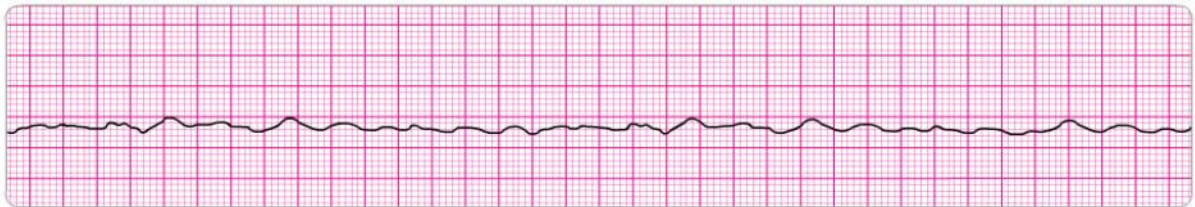
- a) Adult pads may be used, but they should be cut in half before application.
- b) Adult pads/dose may be used if pediatric pads/dose attenuator are not available.
- c) Only adult pads or a dose attenuator may be used.
- d) Infant pads may be used if pediatric pads are unavailable.

Resuscitation Knowledge Test 3

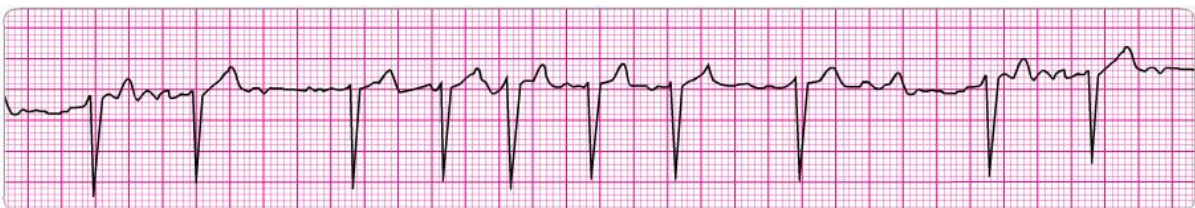
For each of the following rhythm 1 -5 please choose the appropriate answer from the list below:

- a) Normal Sinus Rhythm
- b) Sinus Tachycardia
- c) Supraventricular Tachycardia
- d) Fine Ventricular Fibrillation
- e) Monomorphic Ventricular Tachycardia
- f) 2nd degree I Block
- g) 2nd degree II Block
- h) 3rd degree block
- i) Sinus Bradycardia
- j) Atrial Flutter
- k) Atrial Fibrillation
- l) Coarse Ventricular Fibrillation
- m) Polymorphic Ventricular Tachycardia/Torsades
- n) Agonal rhythm/asystole
- o) Pulseless Electrical Activity

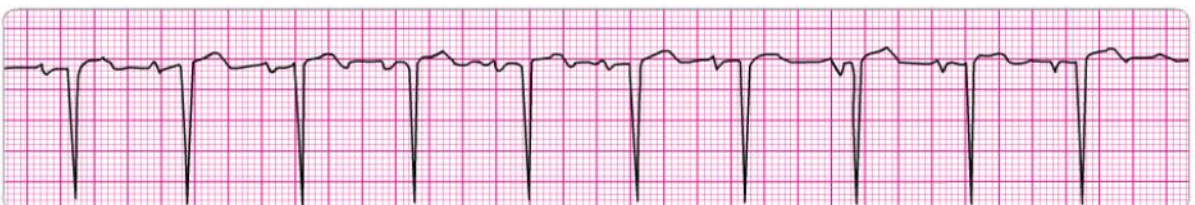
1.



2.



3.



4.



5.



6. A patient is in cardiac arrest. High-quality chest compressions are being given. The patient is intubated and an IV has been started. The rhythm is asystole. Which is the first drug/dose to administer?

- a) Adrenaline 1 mg or vasopressin 40 units IV or IO.
- b) Atropine 1 mg IV or IO.
- c) Atropine 0.5 mg IV or IO.
- d) Adrenaline 3 mg via endotracheal route.
- e) Dopamine 2 to 20 mcg/kg per minute IV or IO.

7. Bradycardia requires treatment when:

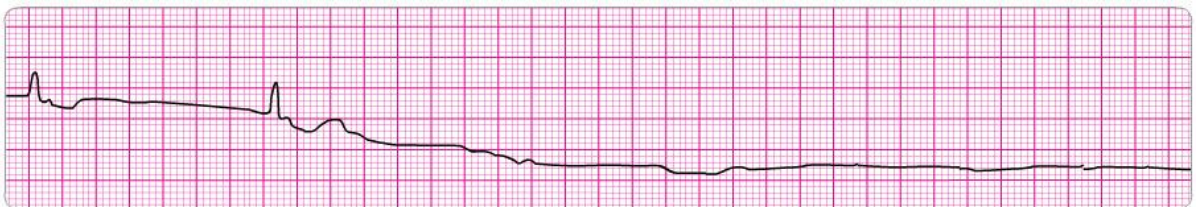
- a) The blood pressure is less than 100 mm Hg systolic with or without symptoms.
- b) The heart rate is less than 60/min with or without symptoms.
- c) The patient's 12-lead ECG show an MI.
- d) Chest pain or shortness of breath is present.

- 8. A patient is in refractory ventricular fibrillation. High-quality CPR is in progress, and shocks have been given. One dose of adrenaline was given after the second shock. An antiarrhythmic drug was given immediately after the third shock. What drug should the team leader request to be prepared for administration next?**
- a) Escalating dose of adrenaline 3 mg.
 - b) Second dose of adrenaline 1 mg
 - c) Repeat the antiarrhythmic drug
 - d) Sodium bicarbonate 50 mEq
- 9. A patient is in pulseless ventricular tachycardia. Two shocks and 1 dose of adrenaline have been given. Which is the next drug/dose to anticipate to administer?**
- a) Amiodarone 300 mg
 - b) Amiodarone 150 mg
 - c) Vasopressin 40 units
 - d) Adrenaline 3 mg
 - e) Lignocaine 0.5 mg/kg
- 10. A 35-year-old woman has palpitations, light-headedness, and a stable tachycardia. The monitor shows a regular narrow-complex QRS at a rate of 180/min. Vagal maneuvers have not been effective in terminating the rhythm. An IV has been established. What drug should be administered IV?**
- a) Lignocaine 1mg/kg
 - b) Adenosine 6 mg
 - c) Adrenaline 2 to 10 mcg/kg per minute
 - d) Atropine 0.5 mg

- 11. A patient has been resuscitated from cardiac arrest and is being prepared for transport. She is intubated and is receiving 100% oxygen. Blood pressure is 80/60 mm Hg. During the resuscitation, she received 2 doses of adrenaline 1 mg and 1 dose of amiodarone 300 mg IV. You now observe this rhythm on the cardiac monitor. The rhythm abnormality is becoming more frequent and increasing in number. You should order:**



- a) Amiodarone 150 mg IV bolus; start infusion.
 - b) A repeat dose of adrenaline 1 mg IV.
 - c) Lignocaine 1 to 1.5 mg IV; start infusion.
 - d) 1 to 2 L of normal saline.
 - e) Amiodarone 300 mg IV.
- 12. A patient was in refractory ventricular fibrillation. A third shock has just been administered. Your team looks to you for instructions. Your immediate next order is:**



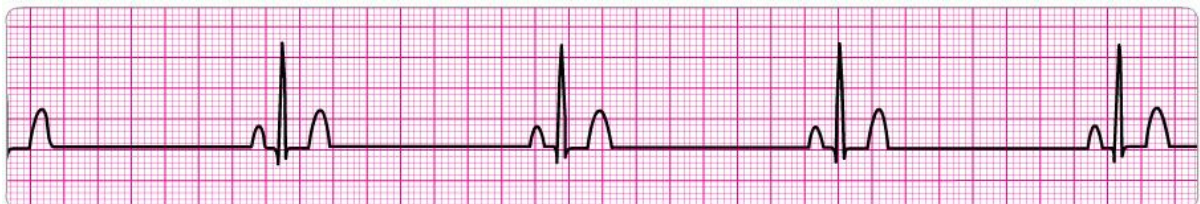
- a) Perform endotracheal intubation.
- b) Resume high-quality chest compressions.
- c) Check the carotid pulse.
- d) Give atropine 1 mg IV.
- e) Give amiodarone 300 mg IV.

13. You are the code team leader and arrive to find a patient with above rhythm and CPR in progress. Team members report that the patient was well but reported chest pain and then collapsed. She has no pulse or respirations. Bag-mask ventilations are producing visible chest rise, high-quality CPR is in progress, and an IV has been established. What would be your next order?



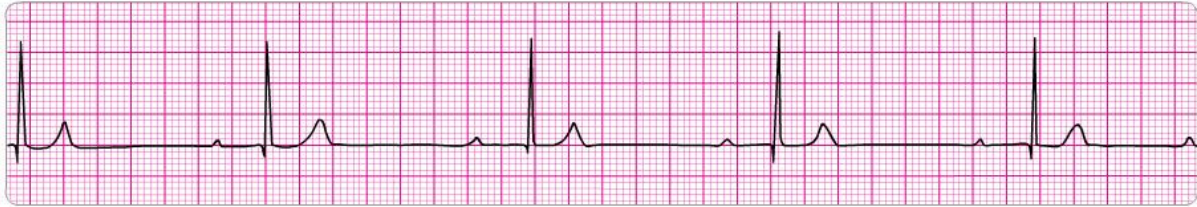
- a) Administer atropine 1 mg.
- b) Perform endotracheal intubation.
- c) Start dopamine at 10 to 20 mcg/kg per minute.
- d) Administer adrenaline 1 mg.
- e) Administer amiodarone 300 mg.

14. The patient suddenly becomes unconscious and has a weak carotid pulse. Cardiac monitoring, supplementary oxygen, and an IV have been initiated. The code cart with all the drugs and transcutaneous pacer are immediately available. Next you would:



- a) Begin transcutaneous pacing.
- b) Initiate dopamine at 10 to 20 mcg/kg per minute and to patient response.
- c) Initiate dopamine at 2 to 10 mcg/kg per minute and titrate to patient response.
- d) Give atropine 0.5 mg IV.
- e) Initiate adrenaline at 2 to 10 mcg/kg per minute.

15. You arrive on the scene to find CPR in progress. Nursing staff report that the patient was recovering from a pulmonary embolism and suddenly collapsed. There is no pulse or spontaneous respirations. High-quality CPR and effective bag-mask ventilation are being provided. An IV has been initiated. What would you do now?



- a) Give atropine 1 mg IV.
- b) Give atropine 0.5 mg IV
- c) Order immediate endotracheal intubation.
- d) Give adrenaline 1 mg IV.
- e) Initiate transcutaneous pacing.

16. You are participating in the elective intubation of a 4-year-old child with respiratory failure. You must select the appropriate sized uncuffed endotracheal tube. You do not have a colour-coded, length-based tape to use to estimate correct endotracheal tube size. Which of the following is the most appropriate estimated size uncuffed endotracheal tube for an average 4-year-old?

- a) 3-mm tube
- b) 4-mm tube
- c) 5-mm tube
- d) 6-mm tube

17. You have just assisted with the elective endotracheal intubation of a child with respiratory failure and a perfusing rhythm. Which of the following provides the most reliable, prompt assessment of correct endotracheal tube placement in this child?

- a) Absence of audible breath sounds over the abdomen during positive-pressure ventilation
- b) Auscultation of breath sounds over the lateral chest bilaterally plus presence of mist in the endotracheal tube
- c) Confirmation of appropriate oxygen and carbon dioxide tensions on arterial blood gas analysis
- d) Clinical assessment of adequate bilateral breath sounds and chest expansion plus presence of exhaled CO₂ in a colourimetric detection device after delivery of 6 positive-pressure ventilations

18. An 18-month-old child presents with a 1-week history of cough and runny nose. You perform a general assessment, which reveals a toddler responsive only to painful stimulation with slow respirations and diffuse cyanosis. You begin a primary assessment and find that the child's respiratory rate has fallen from 65/min to 10/min, severe inspiratory intercostal retractions are present, heart rate is 160/min, SpO₂ is 65% in room air, and capillary refill is less than 2 seconds. Which of the following is the most appropriate immediate treatment for this toddler?

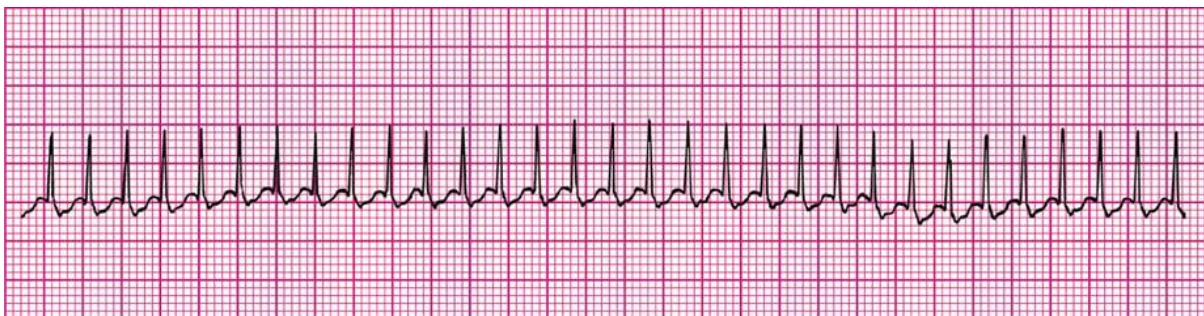
- a) Establish vascular access and administer a 20 mL/kg bolus of isotonic crystalloid
- b) Open the airway and provide positive-pressure ventilation using 100% oxygen and a bag-mask device
- c) Administer 100% oxygen by face mask, establish vascular access, and obtain a STAT chest x-ray
- d) Administer 100% oxygen by face mask, obtain an arterial blood gas, and establish vascular access

19. A child becomes unresponsive in the emergency department and is not breathing. You provide ventilation with 100% oxygen. You are uncertain if a faint pulse is present with the following rhythm:



What is your *next* action?

- a) Begin high-quality chest compressions with ventilations
 - b) Order transcutaneous pacing
 - c) Start an IV and give atropine 0.01 mg/kg IV
 - d) Start an IV and give adrenaline 0.01 mg/kg IV (0.1 mL/kg of 1:10,000 dilution)
20. A 1-year-old male is brought to the emergency department for evaluation of poor feeding, fussiness, and sweating. On general assessment he is lethargic but arousable and has labored breathing and a dusky colour. Primary assessment reveals a respiratory rate of 68/min, heart rate 300/min that does not vary with activity or sleep, blood pressure 70/45 mm Hg, weak brachial pulses and absent radial pulses, capillary refill 6 seconds, SpO₂ 85% in room air, and good bilateral breath sounds. You administer high-flow oxygen and place the child on a cardiac monitor. You see the following rhythm with little beat-to-beat variability of the heart rate:



Secondary assessment reveals no history of congenital heart disease. IV access has been established. Which of the following therapies is most appropriate for this infant?

- a) Make an appointment with a paediatric cardiologist for later in the week
- b) Adenosine 0.1 mg/kg IV rapidly; if adenosine is not immediately available, perform synchronized cardioversion
- c) Perform immediate defibrillation without waiting for IV access
- d) Establish IV access and administer a fluid bolus of 20 mL/kg isotonic crystalloid

21. After you identify an unresponsive victim with no breathing (or no normal breathing), what would be your first next step?

- a) Feel for central pulse
- b) Start with Chest compressions
- c) Give a rescue breath
- d) Find an AED

22. If a victim of foreign body airway obstruction becomes unresponsive, the rescuer should send someone to activate the emergency response system and immediately

- a) Start CPR beginning with compressions
- b) Call the victim's doctor
- c) Performs blind finger sweeps
- d) Perform abdominal thrusts

23. The compression-to-ventilation ratio for 1-rescuer adult CPR is

- a) 15:2
- b) 20:2
- c) 30:2
- d) 5:1

24. Which of the following options lists the correct compression and ventilation rates for 2- rescuer CPR in the presence of an advanced airway?

- a) Compress at a rate of at least 100 per minute, 2 breaths every 5 to 10 seconds.
- b) Compress at a rate of at least 60 per minute, 1 breath every 5 to 10 seconds.
- c) Compress at a rate of at least 60 per minute, 1 breath every 6 to 8 seconds.
- d) Compress at a rate of at least 100 per minute, 1 breath every 6 to 8 seconds.

25. When a child has a heart rate greater than 60 per minute and a pulse but is not breathing effectively, the rescuer should?

- a) Give breaths without chest compressions.
- b) Give chest compressions without breaths.
- c) Give breaths and chest compressions.
- d) Connect the AED to the child and analyse.

Appendix H: Practical skills evaluation checklist

Cardiac Arrest VF/Pulseless VT Checklist

Participant number:

Pre-Rotation ☐

Post-Rotation ☐

	Yes	No
Recognise Cardiac Arrest		
Call for help		
Call for defibrillator		
CPR		
hard and fast (5cm and 100/min)		
minimum interruptions		
2 minutes		
Rhythm Analysis		
Identify rhythm		
less than 10 seconds		
Shock		
360J / 200J		
immediatedly when available		
Drug Administration		
Adrenaline		
1 mg		
3-5 minutes		
Amiodarone (if appropriate)		
300mg bolus		
Look for reversible causes / H's & T's		
Recognise Return Of Spontaneous Circulation		

		1-2
		3

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	22
	23

Cardiac Arrest PEA/Asystole Checklist

Participant number:

Pre-Rotation ☐

Post-Rotation ☐

	Yes	No
Recognise Cardiac Arrest		
Call for help		
Call for defibrillator		
CPR		
hard and fast (5cm and 100/min)		
minimum interruptions		
2 minutes		
Rhythm Analysis		
Identify rhythm		
less than 10 seconds		
Shock - DO NOT		
Adrenaline		
1 mg		
3 - 5 minutes		
Appropriate Drug use		
Look for reversible causes / H's & T's		
Recognise Return of Spontaneous Circulation		

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