KNOWLEDGE OF DEFIBRILLATION PRACTICE AMONGST NURSES AND MEDICAL DOCTORS AT A TERTIARY HOSPITAL IN GAUTENG, SOUTH AFRICA.

Joseph Iziegbe Osawe

Student number: 1319501

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the degree of Master of Medicine (Emergency Medicine)

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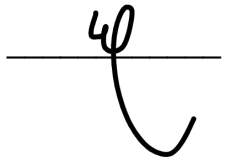
Declaration

I, Joseph Iziegbe Osawe, student number 1319501, declare that the research report is my work. It is being submitted for the Master of Medicine in Emergency Medicine degree at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

Joseph Osawe  23rd September 2024

Acknowledgement

To my Redeemer, my Lord and Saviour, Jesus Christ, who has shown me mercy.

To my beloved wife, Vivian, my rock and constant support system. Your unwavering dedication and boundless love have been the driving force behind everything I have achieved. Without you, none of it would have been possible. You are my source of strength and inspiration, and I am forever grateful to have you by my side. Thank you for being the most amazing partner I could ever ask for.

To my beloved son, Joseph Efosa Osawe, I want to remind you of the power within you. Your unwavering love and infectious joy testify to your pure and unbreakable spirit. As you go through life, remember the message in this work—that you can exceed all expectations and achieve greatness. Always believe in yourself, my dear son.

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Abstract

Introduction

Defibrillation is a potentially crucial component in resuscitating cardiac arrest patients. Appropriately trained healthcare workers in an emergency department should be able to identify a rhythm requiring defibrillation. This study assesses the knowledge of defibrillation at a South African academic hospital.

Methods

This mixed-method cross-sectional study was conducted from 20 December 2022 to 20 May 2023. Various levels of nurses and medical doctors working in the emergency department were given questionnaires to enquire about their knowledge and understanding of defibrillation.

Results

One hundred and two questionnaires were returned, of which 34 (33.3%) were nurses, and 68 (66.7%) were doctors. There was no significant difference in defibrillator location awareness between doctors and nurses in the ED (89.7% vs. 88.2%, p= 0.999). Only 46 (46.0%) of the respondents knew the first energy requirement (Joules) to defibrillate a patient correctly, four nurses (11.8%) and 42 doctors (61.8%), respectively (p< 0.001). Having done an ACLS course was associated with knowledge of the first energy requirement of a shockable rhythm (p= 0.001), the correct pads/paddle placement (P= 0.001), indications for defibrillation (p< 0.001), and the type of defibrillator (p < 0.001). Being a doctor, having done an ACLS course, and having more than five years of experience were statistically significant in identifying all the rhythms correctly (p= 0.029, 0.002, and 0.038), respectively.

Conclusion

Medical doctors and nurses working in the ED should be continuously monitored for defibrillation knowledge, and medical professionals should receive regular and updated training.

Keywords

In Hospital Cardiac arrest

Defibrillation

Low and Middle-Income Countries

Emergency Medicine in Africa

African relevance

As emergency medicine gradually gathers momentum in Africa, defibrillation, a lifesaving procedure for shockable rhythms, should be available and taught to all emergency care workers.

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List of Abbreviations

AHA:	American Heart Association
ACLS:	Advanced Cardiovascular Life Support
AFJEM:	African Journal of Emergency Medicine
CEO:	Chief Executive Officer
CPR:	Cardiopulmonary Resuscitation
EC:	Emergency Center
ED:	Emergency Department
EMSSA:	Emergency Medicine Society of South Africa
FDA:	Food and Drug Association
IHCA:	In-Hospital Cardiac Arrest
MMED:	Master of Medicine
OHCA:	Out of Hospital Cardiac Arrest
pVT:	Pulseless Ventricular Tachycardia
VF:	Ventricular Fibrillation
VT:	Ventricular Tachycardia

Chapter 1: Introduction to Research Report

This Master of Medicine (MMED) report is presented in an article format approved by the Faculty of Health Sciences, University of the Witwatersrand.

This is a mixed-method study of the knowledge and practice of defibrillation among nurses and doctors at a tertiary hospital in Gauteng, South Africa.

The content of an article format of the Master of Medicine research report as required by the faculty of Health Sciences are as follows:

- The research protocol.
- The research report in an article format

Chapter 2: Research Protocol

2.1 Knowledge of defibrillation practice amongst nurses and medical doctors at a tertiary hospital in Gauteng, South Africa.

2.2 Introduction

During the Euro 2020 competition, Christian Eriksen collapsed in the stadium in a football match between Denmark and Finland. The Danish Captain, Simon Kjaer, noted it was a severe event and quickly notified the medical team to enter the stadium. The Danish team players promptly formed a shield around him while the medical team performed cardiopulmonary resuscitation. He was defibrillated, which returned spontaneous circulation in the stadium, and he was quickly transferred to the hospital. Denmark would go on to lose the match 1-0 to Finland. One Danish newspaper said, “Denmark lost. But life won”. Without the presence of a defibrillator and people experienced in its use, he probably would have died.

The system of care guideline, according to the American Heart Association (AHA), focuses on building up the number of patients who receive prompt cardiopulmonary resuscitation (CPR) and early defibrillation in out-of-hospital cardiac arrest (OHCA), preventing in-hospital cardiac arrest (IHCA) and improving resuscitation team performance and resuscitation outcomes (1). Improving resuscitation outcomes in hospitals would involve constant monitoring and capacity building to ensure that staff are well-equipped and trained to administer defibrillation. It is unknown if this knowledge gap regarding defibrillation exists among the hospitals’ emergency departments in Gauteng.

Cardiac defibrillation is administering a transthoracic electrical current to an individual having one of the two lethal ventricular dysrhythmias, viz ventricular fibrillation (VF) or pulseless ventricular tachycardia (pVT) (2). Most resuscitation success is accomplished by providing high-quality CPR and defibrillation for those with a shockable rhythm; CPR should not be delayed before the defibrillator is readied for use (3).

Defibrillation is highly efficient in terminating ventricular fibrillation and pulseless ventricular tachycardia when performed as close as possible to the onset of ventricular fibrillation. If delayed, the effectiveness reduces by 10% per minute (2). In 1956, alternating current for transthoracic defibrillation was initially implemented to treat ventricular fibrillation in humans (4). As a result of this significant advancement, direct current defibrillators were introduced into clinical practice in 1962 (5). Further research conducted in the early 1960s showed that applying electrical countershock or cardioversion to the closed chest might eliminate several types of cardiac arrhythmias in addition to ventricular fibrillation (5).

Immediate defibrillation is considered the most effective treatment for a patient experiencing ventricular fibrillation (VF) or pulseless ventricular tachycardia (pVT) (4). Ventricular fibrillation is frequently associated with underlying structural heart disease. Other common conditions that are linked to ventricular fibrillation include electrolyte abnormalities such as hypokalemia, hyperkalemia, and hypomagnesemia, as well as acidosis, hypothermia, hypoxia, cardiomyopathies, a family history of sudden cardiac death, congenital QT abnormalities, Brugada syndrome, and alcohol use (5). In addition to its primary function, the defibrillator has other uses in the emergency department, such as bedside monitoring, synchronized electrical cardioversion, and electrical pacing, provided the required software is installed. If safety procedures are not followed, the defibrillator can result in substantial injuries (6). The Food and Drug Administration (FDA) received reports of thirteen injuries during three and a half years. Most of these injuries were related to moderate shocks or burns (7).

The possibility of healthcare practitioners being harmed by an unintended shock during a resuscitation effort has resulted in a cautious approach to teaching defibrillation. This approach emphasizes the importance of doing regular safety checks before administering the shock (4). These safety stop checks have led to longer intervals before administering the initial electric shock. Potential dangers to the resuscitation provider resulting from unintentional defibrillation include the possibility of experiencing a fatal arrhythmia, nerve injury, burns to the skin, damage to muscles, and additional harm caused by intense muscle spasms (4).

Defibrillator technology has improved significantly over the last decade with reduced use of high-energy monophasic defibrillators, real-time impedance compensation, and improved electrode–skin coupling through self-adhesive electrode pads, thus reducing the potential risks of accidental defibrillation (4). Lloyd et al. demonstrated that using biphasic defibrillators, medical polyethylene gloves could be worn during hands-on defibrillation during cardioversion (5). This is yet to be standard practice. Recent work by Wight et al. at Emory University in 2020 corroborated Lloyd et al.'s findings that polyethylene gloves allow the safe continuation of compressions through shock delivery (6). This practice could lead to an increase in compression fraction during CPR and improve outcomes.

A study conducted in the Western Cape involving 266 doctors and nurses revealed that 58% of the participants had not received prior defibrillator training. Among the participants, 96% were aware of the presence of a defibrillator in their Emergency Center (EC), only 42% knew specifically which defibrillator it was, and 58% correctly recognized that their EC had pacing capabilities (7). However, 88% of the population observed its use; additionally, the training rates for manual defibrillator usage were low, with only 13% of nurses and 30% of sisters having had such training (7). Similarly, in Durban, in a study amongst nurses by Dulandas and Brysiewicz (8) 72% (n=92) of the participants agreed that emergency education was a need.

The American Heart Association (AHA) has adopted the Utstein formula of survival, which states that the likelihood of surviving resuscitation is increased through the combined efforts of advancing and sharing medical knowledge, providing practical training to resuscitation providers, and promoting collaboration among caregivers involved in all stages of resuscitation (1). According to the 2020 guidelines from the AHA, all healthcare personnel likely to be involved in caring for adult cardiac arrest patients should complete an ACLS course or equivalent training (9). Training resuscitation providers, viz nurses, and doctors, remains the responsibility of healthcare workers in South Africa. This may directly impact the quality of resuscitation care provided if medical doctors and nurses are not motivated nor have the financial capability to upskill their knowledge.

Defibrillation is so successful if used early after a lethal shockable rhythm (2), which results in lives saved; healthcare workers in the emergency department must know how and when to defibrillate. This study aims to evaluate the knowledge of defibrillation among medical doctors and nurses at the Helen Joseph Hospital Emergency Department.

2.3 Study Objectives

1. To describe the knowledge of defibrillation among medical doctors and nurses in the emergency department.
2. To describe medical doctors' and nurses' awareness of defibrillation.
3. To describe the adequacy of defibrillation practice among medical doctors and nurses in the emergency department.

2.4 Methodology

2.4.1 Study design

This study will be a mixed method cross-sectional questionnaire-based study.

2.4.1.1 Study population and sample

2.4.1.2 Inclusion and Exclusion Criteria

2.4.1.3 Inclusion criteria

- All doctors and nurses in the emergency department.

2.4.1.4 Exclusion criteria

- All emergency medicine consultant physicians due to ease of identification by the researcher

2.5 Setting

The site will be Helen Joseph Hospital Emergency Department. Helen Joseph Hospital is a tertiary hospital in the central business district of Johannesburg, serving a population of close to one million low to middle-income people. The Emergency Department (ED) attends to about 60,000 patients annually (9). The Helen Joseph Emergency Department attends to only adult emergencies, as paediatric and maternity cases are attended by a designated hospital nearby. The Emergency Department at the Helen Joseph Hospital is divided into red, orange, and yellow areas. The staff strength comprises three Emergency Medicine consultant physicians, three Registrars, fifteen full-time Medical Officers, ten sessional doctors, three overtime doctors, twelve Interns and Community service doctors, and one hundred nurses; the total number of medical doctors and nurses is one hundred and thirty-eight. This study will be conducted among all nurses and doctors in the emergency department, which represents the sample population.

The data was collected from 20 December 2022 to 20 May 2023.

2.5.1 Sample size

The target population is 38 medical doctors and 100 nurses in the Helen Joseph Hospital ED. This totals a maximum of 138 questionnaires (The numbers are approximate because of staff variation on a month-to-month basis). A return of 102 completed questionnaires would give a 95% confidence interval reflecting the current knowledge of the medical doctors and nurses in the Helen Joseph Hospital Emergency Department.

2.5.2 Sampling method

During the weekly academic meetings at the Helen Joseph Hospital ED, the researcher will personally meet potential participants, explain his requests, and discuss and review the contents of the information sheet and consent forms. The researcher will then give

all medical doctors and nurses an information sheet and consent form before presenting the questionnaires. Participants will be asked to sign a consent form to participate in the research. There will be no coercion on house officers, junior doctors, and nurses to participate in the study. Once the information sheets and consent forms have been completed, participants will be given the questionnaire and have the option to complete the questionnaire or hand it back, not completed, if they wish to refrain from participating. Once the participants finish their questionnaire, whether complete, partially complete, or not completed, they will place their questionnaire and consent form in a box that the researcher will collect.

Permission will be obtained from the Head of Helen Joseph Hospital Emergency Department and the Chief Executive Officer of Helen Joseph Hospital to conduct research at their facility.

2.5.3 Method and technique of sampling

A questionnaire was developed from previous questionnaires from similar studies (Appendix 2). Louw et al. have given permission (7) and Shrestha et al. (10) to use their questionnaires as a basis for the study. The questionnaire comprises a total of 36 questions in four parts. Part one is the demographic of the study population, part two is knowledge, part three is awareness and attitude, and part four is practice questions. Questions 1,6-13, 17, 19, 20-24, 27-31 were adapted from Shrestha et al., and questions 2-5,14, and 16 were from Louw et al. The researcher and supervisors designed questions 15, 18, 25, 26, 28, 30, 32 and 34.

Some questions in the questionnaire have been modified to capture the study's aims. The modified questions from the original questionnaire are 1-6, 8, 9, 12, 14, 23, 25, 26, and 27-29.

2.5.4 The variables

All variables to be obtained are itemized in the questionnaire attached.

2.5.5 Statistical analyses

The data from the questionnaires will be entered into a Microsoft® excel® spreadsheet on a password-protected computer; data will be analyzed using Stata version 16(Stata Corp Ltd, College Station, TX).

All the categorical variables would be presented as frequencies and percentages. The continuous variables would be presented as mean and standard deviation or median and interquartile range.

Based on the given answers, the responses were classified as correct/ incorrect or yes/no. A p-value of 0.05 or less will be considered significant.

The researcher will analyze the questionnaire's open-ended questions, viz 24 and 25; the researcher recognizes the difficulty of subjecting such questions to the rigid framework of a scoring system. Thematic analysis will be conducted as described by Braun and Clark (11, 12) Similar answers or patterned responses will be assigned a code or category, and the author and two other statisticians (PL and OA) will use thematic analysis to identify themes independently.

2.6 Ethics

An application will be made to the University of Witwatersrand Human Research Ethics Committee (Medical) for approval.

Permission will be obtained from the CEO’s office and the Head of the Emergency Department at Helen Joseph Hospital.

2.7 Funding

The researcher would bear all costs incurred during this project. The budget is estimated to be less than R1,000.00, mainly for printing questionnaires and travel.

2.8 Timing

Below is the expected duration of the research.

2021	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Literature review												
Preparing protocol												
2022												
Protocol assessment												
Ethics application												
Data collection												
2023												
Data collection												
Data analysis												
Writing up												

2024												
Writing up												
Final report												

2.9 References

1. Berg, K.M., et al., Part 7: Systems of Care: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation, 2020. 142(16_suppl_2): p. S580-S604.
2. Goyal, A., et al., Defibrillation, in StatPearls. 2022: Treasure Island (FL).
3. Panchal, A.R., et al., Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation, 2020. 142(16_suppl_2): p. S366-S468.
4. Koumbourlis, A.C., Electrical injuries. Crit Care Med, 2002. 30(11 Suppl): p. S424-30.
5. Lloyd, M.S., et al., Hands-on defibrillation: an analysis of electrical current flow through rescuers in direct contact with patients during biphasic external defibrillation. Circulation, 2008. 117(19): p. 2510-4.
6. Wight, J.A., et al., Hands-on defibrillation with safety drapes: Analysis of compressions and an alternate current pathway. Am J Emerg Med, 2022. 52: p. 132-136.
7. Louw, P., D. Maritz, and L. Wallis, Emergency centres lack defibrillator knowledge. S Afr Med J, 2010. 100(7): p. 435-6.
8. Dulandas, R. and P. Brysiewicz, A description of the self-perceived educational needs of emergency nurses in Durban, KwaZulu-Natal, South Africa. Afr J Emerg Med, 2018. 8(3): p. 84-88.
9. Venter, A., et al., Locked down: Impact of COVID-19 restrictions on trauma presentations to the emergency department. S Afr Med J, 2020. 111(1): p. 52-56.
10. Shrestha, R., et al., In-situ Simulation-Based Module to Train Interns in Resuscitation Skills During Cardiac Arrest. Adv Med Educ Pract, 2020. 11: p. 271-285.
11. Braun, V. and V. Clarke, Supporting best practice in reflexive thematic analysis reporting in Palliative Medicine: A review of published research and introduction to the Reflexive Thematic Analysis Reporting Guidelines (RTARG). Palliat Med, 2024: p. 2692163241234800.

12. Braun, V. and V. Clarke, Is thematic analysis used well in health psychology? A critical review of published research, with recommendations for quality practice and reporting. Health Psychol Rev, 2023. 17(4): p. 695-718.
13. Zoll, P.M., et al., Termination of ventricular fibrillation in man by externally applied electric countershock. N Engl J Med, 1956. 254(16): p. 727-32.
14. Lown, B., R. Amarasingham, and J. Neuman, New method for terminating cardiac arrhythmias. Use of synchronized capacitor discharge. JAMA, 1962. 182: p. 548-55.

Chapter 3: Research Report

3.1 Introduction

The system of care guideline, according to the American Heart Association (AHA), focuses on increasing the proportion of patients who receive prompt cardiopulmonary resuscitation (CPR) and early defibrillation in out-of-hospital cardiac arrest, preventing in-hospital cardiac arrest (IHCA) and improving resuscitation team performance and resuscitation outcomes (1). Improving resuscitation outcomes in hospitals involves constant monitoring and capacity building to ensure that staff are well-equipped and trained to administer defibrillation. In 1956, alternating current for transthoracic defibrillation was first used to treat human ventricular fibrillation (13). Following this breakthrough, in 1962, direct current defibrillators were introduced into clinical practice (14). Subsequent studies in the early 1960s demonstrated that electrical countershock or cardioversion across the closed chest could abolish other cardiac arrhythmias in addition to ventricular fibrillation (14).

Cardiac defibrillation is administering a transthoracic electrical current to one of the lethal ventricular dysrhythmias, viz ventricular fibrillation or pulseless ventricular tachycardia (2). Most resuscitation success is achieved by early defibrillation for those with a shockable rhythm, as well as by providing high-quality CPR (2, 3). Cardiopulmonary resuscitation should not be delayed while the defibrillator is readied for use (3). Defibrillation is highly effective in terminating ventricular fibrillation and pulseless ventricular tachycardia when performed as close as possible to the onset of ventricular fibrillation (2). When delayed, the effectiveness is reduced by 10% per minute (2). When coupled with CPR VF decays by approximately 3-4% per minute which allows delayed defibrillation to still be successful (15)

Prompt defibrillation remains the gold standard treatment for a patient with ventricular fibrillation (VF) or pulseless ventricular tachycardia (pVT) (16). Ventricular fibrillation is often linked to underlying structural heart disease (2, 17). Other common conditions associated with VF include electrolyte abnormalities, acidosis, hypothermia, hypoxia, cardiomyopathies, familial congenital QT

abnormalities, Brugada syndrome, and alcohol use (17). The defibrillator also serves other purposes in the emergency department, like bedside monitoring, synchronized electrical cardioversion, and electrical pacing if the necessary software is installed.

The defibrillator risks causing injuries if safety precautions are not adhered to (18). Thirteen injuries were reported to the Food and Drug Administration in the United States of America over three and a half years, and most injuries involved a mild shock or burn (19). The potential risk of harm to healthcare professionals from receiving an accidental shock during a resuscitation attempt has led to a culture of teaching defibrillation that has erred on the side of caution (18). Hypothetical risks to the resuscitation provider from accidental defibrillation include the development of lethal dysrhythmia, nerve damage, cutaneous burns, muscle damage, and secondary trauma from tetanic muscle contractions (4).

In a prospective cross-sectional study done in the Western Cape among 266 doctors and nurses, 58% of the participants had no previous defibrillator training, and only 13% of nurses and 30% of sisters had received training, compared with 88% of doctors (7). Of the participants, 96% knew that a defibrillator was present in their emergency center; however, only 42% knew which defibrillator it was (7). While only 58% of personnel had not used a defibrillator before, 88% had witnessed it being used (7). In South Africa, professional and enrolled nurses are called sisters and nurses respectively. In a quantitative descriptive study done in Durban among nurses (8) 72% (n=92) of the participants agreed that emergency education was a need.

Resuscitation survival is based on synergy achieved by developing and disseminating medical science, and educational efficiency, including practical training of resuscitation providers and local implementation and collaboration between caregivers involved in all stages of resuscitation (1).

Per recommendations from the AHA in the 2020 guidelines, all healthcare professionals likely to participate in caring for adult cardiac arrest patients should take an ACLS course or equivalent (20). Continuous medical education remains largely the responsibility of

each healthcare worker in South Africa. This may directly impact the quality of resuscitation care provided as medical doctors and nurses need to be motivated and have the financial capability to upskill their knowledge.

Defibrillation is highly successful if used early after a lethal shockable rhythm (2), so healthcare workers in an emergency department must know how and when to defibrillate. Clearly, there are different scopes of practice in the Emergency Department between nurse and doctors. This study aims to evaluate the knowledge of defibrillation among medical doctors and nurses at an academic hospital in Johannesburg. It is acknowledged that ensuring proper training for emergency department nurses and doctors on the usage of defibrillators during cardiac arrest can significantly enhance patient outcomes in healthcare settings.

3.2 Methods

3.2.1 Study setting

The study was conducted at Helen Joseph Hospital ED, an academic tertiary hospital within the University of Witwatersrand Complex. This hospital is close to Johannesburg's central business district and serves approximately one million low- to middle-income people. The ED attends to about 60,000 patients annually (9). It generally serves adult patients, as a nearby hospital serves the paediatric population.

3.2.2 Study Design and Population

This mixed-method cross-sectional study was conducted from 20 December 2022 until 20 May 2023. The study population included doctors (medical officers, registrars, community service doctors, interns) and nurses (professional and enrolled) in the ED. Before enrolment, the participants were given an anonymous consent form.

3.2.3 Study tool

The researcher administered a paper-based questionnaire to the participants' once informed consent was obtained. This questionnaire was adapted from Shrestha et al. (10) and Louw et al. (7). Based on the given answers, the responses were classified as correct/ incorrect or yes/no.

3.2.4 Statistical analysis

The data was entered into a Microsoft Excel® spreadsheet, and statistical analysis was conducted using Stata version 16 (Stata Corp Ltd, College Station, TX). All the responses from the questionnaire were classified as categorical, and variables were described, reporting frequencies and percentages. Differences in the categorical variables were tested using the Pearson Chi-Square test and Fisher exact tests where appropriate; a two-sided p-value of < 0.05 was considered statistically significant throughout.

The data generated from the open-ended questions were entered into a Microsoft Excel® spreadsheet and read independently by three authors for validation and triangulation. Themes were identified using thematic analysis.

3.3 Ethical consideration

Ethics was obtained from the Human Research Ethics Committee (Medical) of the University of Witwatersrand, with study number M220906.

3.4 Results

Of one hundred and thirty-eight questionnaires administered, 102 (74.0%) were returned for this study. Of the returned questionnaires, 17 (16.7%) were from enrolled nurses, and 17 (16.7%) were from professional nurses, with the remainder being from

Medical Interns 20 (19.6%), Community Service doctors 11 (10.8%), Medical Officers 26 (25.5%) and Registrars 11 (10.8%) (Table 1).

Table 1: Demographics of Nurses and Doctors working in the Emergency Department of Helen Joseph Hospital from 20 December 2022 to 20 May 2023

Characteristics	N=102 (%)
Sex	
Female	78 (71.6)
Male	28 (27.5)
Other (unspecified)	1 (1.0)
Job Description	
Enrolled Nurses	17 (16.7)
Professional Nurses	17 (16.7)
Medical Intern	20 (19.6)
Community service doctor	11 (10.8)
Medical Officers	26 (25.5)
Registrars	11 (10.8)
ACLS Course	
No	59 (57.8)
Yes	43 (42.2)
[a]Other Defibrillator training	
No	42 (41.6)
Yes	59 (58.4)

[b]Years of Experience in ED	
< 1 year	42 (41.6)
1-2 years	18 (17.8)
3-5 years	14 (13.9)
>5 years	27 (26.7)

Missing data: [a] (N=1), [b] (N=1).

Awareness of defibrillator use by nurses and medical doctors in the ED

The nurses were more aware of daily defibrillator tests in the ED than doctors (nurses 91.2% vs doctors 73.5%; p= 0.041). Nurses knew more than doctors about who did these daily tests (p= 0.018). Those with ACLS certifications knew where the defibrillator was located and if daily defibrillator tests were done (p= 0.017 and p= 0.013, respectively). Participants who had more years in the ED knew who did these daily defibrillator tests (p= 0.007), if these tests were done (p= 0.004), and the location of the defibrillator in the ED (p= 0.045), compared to those with less years in the ED. (Table 2).

Table 2: Awareness of defibrillator use by nurses and doctors in Helen Joseph Hospital Emergency Department from 20 December 2022 to 20 May 2023.

Variables	Profession			ACLS			Other training			Years of experience				
	Nurse	Doctor	P value	ACLS Trained	ACLS untrained	P value	Yes	No	P value	<1 year	1-2 years	3-5 years	>5 years	P value
	n=34 (%)	n=68 (%)		n=43 (%)	n=59 (%)		n=59 (%)	n=42 (%)		n=42 (%)	n=18 (%)	n=14 (%)	n=27 (%)	

Is there a defibrillator in the ED?			0.109			0.507			0.170					0.775
No	2 (5.9)	0 (0.0)		0 (0.0)	2 (3.4)		0(0.0)	2(4.8)		2(4.8)	0(0.0)	0(0.0)	0(0.0)	
Yes	32 (94.1)	68 (100.0)		43 (100.0)	57 (96.6)		59(100.0)	40(95.2)		40(95.2)	18(100.0)	14(100.0)	27(100.0)	
Do you know where the defibrillator is located?			0.999			**0.017**			0.783					**0.045**
No	4 (11.8)	7 (10.3)		1 (2.3)	10 (16.9)		6 (10.2)	5 (11.9)		8 (19.1)	1 (5.6)	2 (14.3)	0 (0.0)	
Yes	30 (88.2)	61 (89.7)		42 (97.7)	49 (83.1)		53 (89.8)	37 (88.1)		34 (80.9)	17 (94.4)	12 (85.7)	27 (100.0)	
Are daily defibrillator tests done?			**0.041**			**0.013**			0.894					**0.004**
No	3 (8.8)	18 (26.5)		4 (9.3)	17 (28.8)		12 (20.3)	9 (21.4)		16 (38.1)	1 (5.6)	2 (14.3)	2 (7.4)	
Yes	31 (91.2)	50 (73.5)		39 (90.7)	42 (71.2)		47 (79.7)	33 (78.6)		26 (61.9)	17 (94.4)	12 (85.7)	25 (92.6)	
Who does the tests?			**0.018**			0.681			0.718					**0.007**
Incorrect	1 (2.9)	15 (22.1)		6 (13.9)	10 (16.9)		10 (16.9)	6 (14.3)		13 (30.9)	1 (5.6)	0 (0.0)	2 (7.4)	
Correct	33 (97.1)	53 (77.9)		37 (86.1)	49 (83.1)		49 (83.1)	36 (85.7)		29 (69.1)	17 (94.4)	14 (100.0)	25 (92.6)	

Abbreviation: ED: Emergency Department; ACLS: Advanced Cardiovascular Life Support. p-value< 0.05 shown in boldface.

Knowledge of pad placement and energy requirement

Forty-one (61.8%) of doctors knew what energy setting was required for the first defibrillation attempt, in comparison with 4 (11.8%) of the nurses (p< 0.001). Two-thirds of the participants with ACLS knew the first energy (Joule) setting (p= 0.001). A third of the doctors (n= 23) correctly listed the indications for defibrillation, while 3% (n= 1) of the nurses did (p= 0.001). Being a doctor, having

ACLS training or any other defibrillator training was associated with a correct pad placement (p= 0.001; 0.001 and 0.041, respectively) (Table 3).

Table 3: Knowledge of pad placement and energy requirement among nurses and doctors at the Helen Joseph Hospital Emergency Department from 20 December 2022 to 20 May 2023.

Variables	Profession			ACLS			Other Training			Years of Experience				
	Nurse	Doctor	P-value	ACLS trained	ACLS untrained	P-value	Yes	No	P-value	<1 year	1-2 years	3-5 years	>5 years	P- value
	n=34	n=68		n=43	n=59		n=59	n=42		n=42	n=18	n=14	n=27	
What Joule setting for 1st defibrillation			**<0.001**			**0.001**			0.270					0.807
Incorrect	30 (88.2)	26 (38.2)		15 (34.9)	41 (69.5)		30 (50.9)	26 (61.9)		22 (52.4)	9 (50.0)	9 (64.3)	16 (59.3)	
Correct	4 (11.8)	42 (61.8)		28 (65.1)	18 (30.5)		29 (49.2)	16 (38.1)		20 (47.6)	9 (50.0)	5 (35.7)	11 (40.7)	
[a] **What are the indications for defibrillation?**			**0.001**			**<0.001**			0.668					0.393
Incorrect	29 (96.7)	45 (66.2)		25 (58.1)	49 (89.1)		42 (73.7)	31 (77.5)		34 (80.9)	13 (76.5)	11 (84.6)	16 (64.0)	
Correct	1 (3.3)	23 (33.8)		18 (41.9)	6 (10.9)		15 (26.3)	9 (22.5)		8 (19.1)	4 (23.5)	2 (15.4)	9 (36.0)	
[b] **What is the type of defibrillator?**			**<0.001**			**<0.001**			**0.001**					0.421
Incorrect	15 (55.6)	11 (16.2)		3 (7.0)	23 (44.2)		8 (14.5)	18 (46.2)		14 (33.3)	4 (25.0)	1 (8.3)	7 (29.2)	
Correct	12 (44.4)	57 (83.8)		40 (93.0)	29 (55.8)		47 (85.5)	21 (53.8)		28 (66.7)	12 (75.0)	11 (91.7)	17 (70.8)	
[c] **Pads/ Paddles placement**			**<0.001**			**0.001**			**0.041**					0.624
Incorrect	14 (51.8)	13 (19.1)		5 (11.6)	22 (42.3)		12 (21.1)	15 (40.5)		11 (26.8)	3 (18.7)	5 (38.5)	8 (33.3)	
Correct	13 (48.2)	55 (80.9)		38 (88.4)	30 (57.7)		45 (78.9)	22 (59.5)		30 (73.2)	13 (81.3)	8 (61.5)	16 (66.7)	

Missing data: [a] (n=4); [b]: (n=7); [c]: (n=7). Abbreviation: ED: Emergency Department; ACLS: Advanced Cardiovascular Life Support. p-value< 0.05 shown in boldface.

Knowledge of skills of defibrillation

More than half of the doctors (p< 0.001), a majority of those with ACLS certification (p= 0.001), and more than half of those with five years of experience (p= 0.037) were associated with correctly identifying VF. In comparison, fewer healthcare workers identified pVT correctly: 44 doctors (65.0 %) and four nurses (15.0%) (p< 0.001). Having ACLS was not significantly associated with identifying pVT (p= 0.059), nor was other training (p= 0.350) or years of experience (p= 0.695). Being a doctor (p= 0.029), having done ACLS (p= 0.002), and having more than five years of experience (p= 0.038) were significantly associated with identifying all the rhythms correctly.

Table 4: Knowledge of skills of defibrillation of nurses and doctors at the Helen Joseph Hospital Emergency Department from 20 December 2022 to 20 May 2023.

Variables	Profession			ACLS			Other training			Years of Experience				
	Nurse	Doctor	p-value	ACLS trained	ACLS untrained	p-value	Yes	No	p-value	<1 year	1-2 years	3-5 years	>5 years	p-value
	n=34	n=68		n=43	n=59		n=59	n=42		n=42	n=18	n=14	n=27	
[a] Identifies VF and correctly treats			**<0.001**			**0.001**			0.228					**0.037**
Incorrect	18 (62.1)	6 (8.8)		4 (9.3)	20 (37.0)		12 (20.7)	12 (31.6)		11 (26.2)	1 (5.6)	2 (15.4)	10 (43.5)	
Correct	11 (37.9)	62 (91.2)		39 (90.7)	34 (63.0)		46 (79.3)	26 (68.4)		31 (73.8)	17 (94.4)	11 (84.6)	13 (56.5)	
[b] Correctly names rhythm as VF			**<0.001**			**<0.001**			0.399					**0.036**
Incorrect	22 (88.0)	15 (22.1)		7 (16.3)	30 (60.0)		21 (36.8)	16 (45.7)		20 (48.8)	3 (18.8)	2 (16.7)	12 (52.2)	
Correct	3 (12.0)	53 (77.9)		36 (83.7)	20 (40.0)		36 (63.2)	19 (54.3)		21 (51.2)	13 (81.2)	10 (83.3)	11 (47.8)	

[c] **Identifies pVT and correctly treats**			**<0.001**			0.059			0.350					0.695
Incorrect	22 (84.6)	24 (35.3)		16 (38.1)	30 (57.7)		26 (45.6)	20 (55.6)		21 (51.2)	6 (35.3)	6 (50.0)	12 (52.2)	
Correct	4 (15.4)	44 (64.7)		26 (61.9)	22 (42.3)		31 (54.4)	16 (44.4)		20 (48.8)	11 (64.7)	6 (50.0)	11 (47.8)	
[d] **Correctly names rhythm as pVT**			**0.024**			0.064			0.546					0.156
Incorrect	25 (100.0)	56 (83.6)		35 (81.4)	46 (93.9)		48 (87.3)	32 (88.9)		38 (95.0)	13 (81.2)	11 (91.7)	18 (78.3)	
Correct	0 (0.0)	11 (16.4)		8 (18.6)	3 (6.1)		7 (12.7)	4 (11.1)		2 (5.0)	3 (18.8)	1 (8.3)	5 (21.7)	
[e] **Correctly identifies/ treats both shockable rhythms**			**<0.001**			**0.003**			0.229					0.158
Incorrect	28 (96.5)	29 (42.7)		18 (41.9)	39 (72.3)		31 (54.4)	26 (66.7)		28 (66.7)	6 (35.3)	7 (53.8)	15 (62.5)	
Correct	1 (3.5)	39 (57.3)		25 (58.1)	15 (27.7)		26 (45.6)	13 (33.3)		14 (33.3)	11 (64.7)	6(46.2)	9 (37.5)	
[f] **Correctly names both shockable rhythms**			**0.022**			0.056			0.570					0.169
Incorrect	26 (100.0)	57 (83.8)		35 (81.4)	48 (94.1)		50 (87.7)	32 (88.9)		39 (95.1)	14 (82.3)	11 (91.7)	18 (78.3)	
Correct	0 (0.0)	11 (16.2)		8 (18.6)	3 (5.9)		7 (12.3)	4 (11.1)		2 (4.9)	3 (17.7)	1 (8.3)	5 (21.7)	
[g] **Correctly identifies all rhythms**			**0.029**			**0.002**			0.391					**0.038**
Incorrect	27 (100.0)	58 (85.3)		35 (81.4)	50 (96.1)		50 (87.7)	34 (91.9)		40 (97.6)	14 (82.3)	12 (92.3)	18 (78.3)	
Correct	0 (0.0)	10 (14.7)		8 (18.6)	2 (3.9)		7 (12.3)	3 (8.1)		1 (2.4)	3 (17.7)	1 (7.7)	5 (21.7)	

Missing data: [a]: (n= 5); [b] (n=4); [c] (n= 8); [d] (n= 10), [e] (n=5), [f] (n= 8); [g] (n= 7). Abbreviation: ED: Emergency Department; ACLS: Advanced Cardiovascular Life Support. p-value< 0.05 shown in boldface.

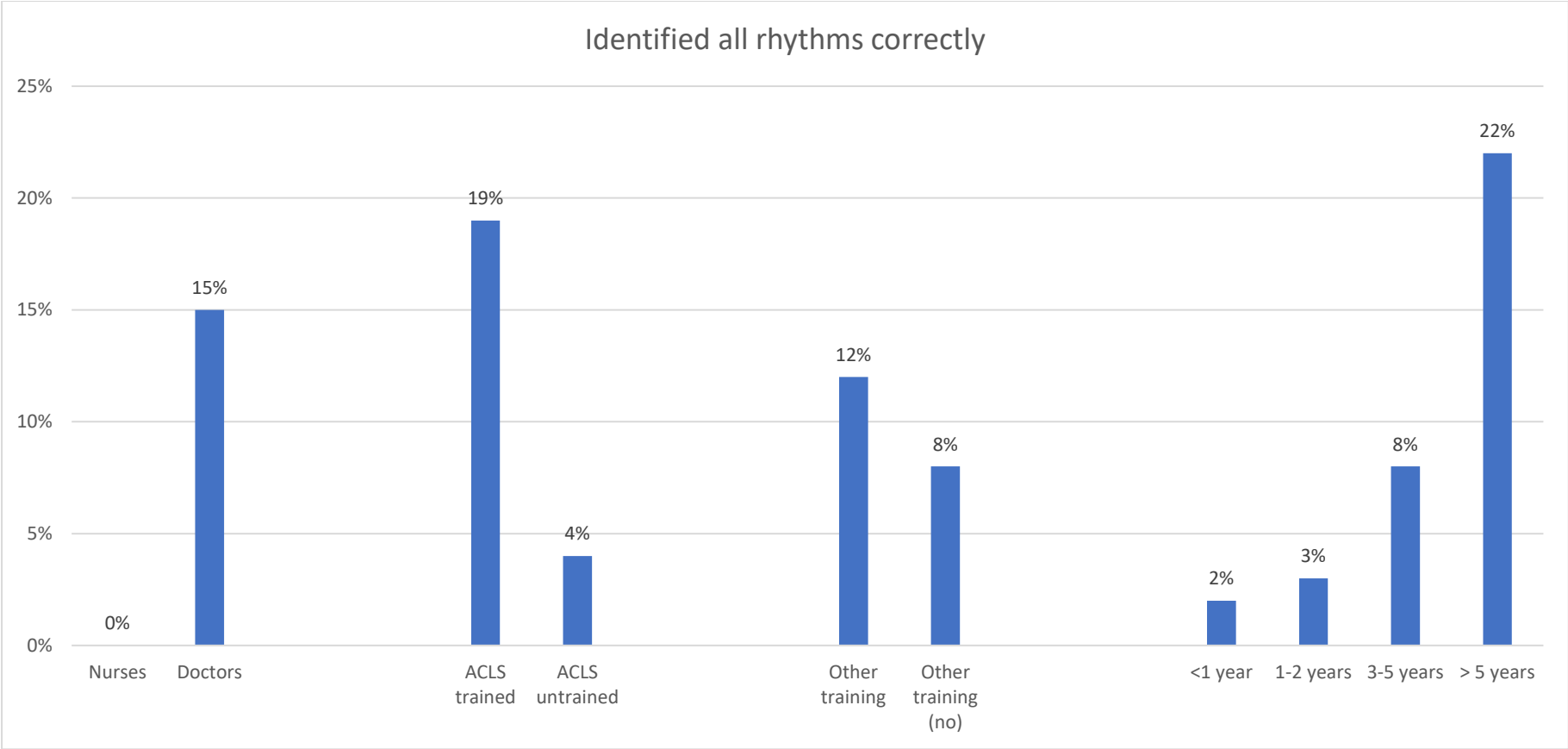


Figure 1: The profile of respondents that identified all rhythms correctly.

3.5 Discussion

This study conducted at the Helen Joseph Hospital ED amongst 34 nurses and 68 doctors shows that more nurses (n=31, 91.0%) knew that daily defibrillator tests were done compared to doctors (n=50, 74.0%, p= 0.041). Those with an ACLS certification (n= 39, 91.0%) knew that daily defibrillator tests were carried out, compared to those without (p= 0.013). Two-fifths (n= 42, 41.0%) of the healthcare workers were in their first year of ED experience, and about 60% of them knew that daily defibrillator tests were done compared to 93% of those who had been working for more than five years (p= 0.004). This shows that the longer one spends in the ED, the more likely they know the location and checks done on the defibrillator. Efforts should be made to emphasize the early recognition of rhythm abnormalities, proper timing of defibrillation procedures, and improvement in medical providers' skills by introducing certified and non-certified programs and local training sessions from the early stages of professional life (21).

In this study, it was found that only 13 nurses (48.0%) knew the proper placement of pads for defibrillation, while 55 doctors (80.0%) did. Among those with ACLS certification, 88.0% knew the proper pad placement, which was statistically significant (p=0.001). Interestingly, 12.0% of those who had attended ACLS training got the pad placement wrong. This suggests that healthcare workers should receive continued training and monitoring to ensure they are competent in correctly placing defibrillation pads.

Those with ACLS certification also knew what energy settings to defibrillate a patient with a shockable rhythm (n= 28, 65.0%) as compared to those without ACLS (n=18, 30.0%) (Table 3). Other training in the use of defibrillators and the years of experience were not statistically significant for knowing what energy was required for the first defibrillation (p= 0.270 vs. p= 0.807). Four (12.0%) of the nurses, compared to 42 (62.0%) doctors, knew the energy requirements for the first defibrillation per the manufacturer’s recommended energy settings. A prospective observational study done in Cape Town in 2010 (7), when emergency medicine was

in its infancy in South Africa, showed that 14% of the healthcare personnel in the ED knew what energy settings were required for the first shock. This study suggests some growth in knowledge in this regard.

In Table 4, it was observed that 11 (38.0%) of the nurses correctly identified VF compared to 62 (92.0%) of the doctors ($p < 0.001$). Forty healthcare workers (91.0%) with ACLS certification correctly identified VF compared to 34 (62.0%) of those without ACLS accreditation ($p = 0.001$). Other defibrillator training had no statistical significance in correctly identifying VF ($P= 0.228$). However, those working in the ED for longer were associated with identifying VF ($p= 0.037$) more accurately. It was a lot more difficult for nurses and doctors to identify pVT, as only 4 (15.0%) nurses and 44 (65.0%) doctors were able to identify this rhythm ($p < 0.001$). Those with ACLS or other training in using a defibrillator and years of experience in the ED were not statistically significant ($p= 0.059$ and $p= 0.695$) for identifying pVT.

Interestingly, only 1 (3.0%) nurse and 39 (57.0%) doctors correctly identified both VF and pVT ($p < 0.001$). An ACLS certification was statistically significant for identifying shockable rhythms ($p= 0.003$). This correlates with a study done in the Paediatric ED in Turkey (21), where it was found that those with BLS-ALS certification were more likely to list the indications for defibrillation correctly.

This study found that having an ACLS certification (Table 4) was statistically significant in correctly identifying all rhythms. More still needs to be done in South Africa to ensure the bare minimum of advanced training in defibrillator use before working in the ED. From the study, about 20% of the doctors were in their first year, and their exposure to emergencies was new. In this ED, doctors usually manage patients in cardiac arrest, while the nurses are more proficient in testing and caring for the equipment. Junior doctors are often observing and acquiring skills from senior staff. Louw et al. posited that nurse-initiated defibrillation in South Africa can be lifesaving, and nursing personnel should be encouraged to add defibrillation to their scope of practice (7). Some studies in Australia

and Hong Kong (22, 23) have shown that nurse-initiated defibrillation could be beneficial. This could be more helpful in the wards and places with no doctors continuously, day and night, but it can benefit patients in all settings.

Per the Emergency Medicine Society of South Africa (EMSSA) recommendation, the hospital must provide opportunities for nurses and doctors in the ED to be certified in ACLS. However, this responsibility is often left in the hands of healthcare practitioners themselves. It is neither easy nor inexpensive to keep up to date with certifications.

Regarding the study's qualitative findings, four main non-exclusive themes were identified in the positive responses to the open-ended questions: lifesaving, technical knowledge, practical considerations, and pedagogical considerations (see Appendix 4). The responses were quite diverse, with some highlighting the critical nature of defibrillators, whereas others expressed confusion about their role in resuscitation and the associated rhythms. The results revealed some uncertainties regarding the role of the defibrillator in resuscitation and the implicated rhythms. Four respondents did not endorse having a defibrillator in all hospital departments, and three of those who did endorse its widespread availability gave incorrect reasons and provided inaccurate justifications. One example of the justification was “when a patient is in respiratory arrest.” Inadequate defibrillator knowledge and skills are consistently cited in qualitative studies among nurses as a barrier to effective resuscitation (24).

This study was limited to a single medical center, so caution must be exercised when generalizing the findings to other academic centers. Furthermore, most healthcare workers involved were in their first year of emergency department experience, which could have impacted their level of investment in emergency medical care. Finally, it is worth mentioning that the study was not simulated in real-time at the bedside. As such, further research is necessary to fully understand the extent of this knowledge gap in a practical simulation.

3.6 Conclusion

Ensuring that healthcare professionals in emergency departments are well-trained to provide prompt and effective care in critical situations is crucial. Defibrillation is a life-saving skill that requires expertise and experience. This research shows that individuals with ACLS training and ED experience have a higher knowledge of defibrillation.

Thus, it is imperative that healthcare organizations take necessary measures to provide adequate training and resources to their staff to improve patient outcomes and that healthcare workers are cognizant of their duties to learn this life-saving skill. By doing so, we can ensure that patients receive timely and effective care during cardiac arrest, leading to an increased chance of survival and better health outcomes.

3.7 Dissemination of results

The results of this study will be shared with the Division of Emergency Medicine, University of Witwatersrand, and may be presented at a future local or international conference or published in a peer-reviewed journal.

3.8 Author's Contribution

Joseph Osawe contributed 60%, Patricia Saffy contributed 20%, Louis Chadinha contributed 10%, and Oluwatosin Ayeni and Phil Leger Contributed 5% each.

3.9 Declaration of competing interests

The authors have no conflict of interest.

References

1. Berg KM, Cheng A, Panchal AR, Topjian AA, Aziz K, Bhanji F, et al. Part 7: Systems of Care: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2020;142(16_suppl_2):S580-S604.
2. Goyal A, Chhabra L, Sciammarella JC, Cooper JS. Defibrillation. StatPearls. Treasure Island (FL)2022.
3. Panchal AR, Bartos JA, Cabanas JG, Donnino MW, Drennan IR, Hirsch KG, et al. Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2020;142(16_suppl_2):S366-S468.
4. Koumbourlis AC. Electrical injuries. Crit Care Med. 2002;30(11 Suppl):S424-30.
5. Lloyd MS, Heeke B, Walter PF, Langberg JJ. Hands-on defibrillation: an analysis of electrical current flow through rescuers in direct contact with patients during biphasic external defibrillation. Circulation. 2008;117(19):2510-4.
6. Wight JA, Bigham TE, Hanson PR, Zahid A, Iravanian S, Perkins PE, et al. Hands-on defibrillation with safety drapes: Analysis of compressions and an alternate current pathway. Am J Emerg Med. 2022;52:132-6.
7. Louw P, Maritz D, Wallis L. Emergency centres lack defibrillator knowledge. S Afr Med J. 2010;100(7):435-6.
8. Dulandas R, Brysiewicz P. A description of the self-perceived educational needs of emergency nurses in Durban, KwaZulu-Natal, South Africa. Afr J Emerg Med. 2018;8(3):84-8.
9. Venter A, Lewis CM, Saffy P, Chadinha LP. Locked down: Impact of COVID-19 restrictions on trauma presentations to the emergency department. S Afr Med J. 2020;111(1):52-6.
10. Shrestha R, Badyal D, Shrestha AP, Shrestha A. In-situ Simulation-Based Module to Train Interns in Resuscitation Skills During Cardiac Arrest. Adv Med Educ Pract. 2020;11:271-85.

11. Braun V, Clarke V. Supporting best practice in reflexive thematic analysis reporting in Palliative Medicine: A review of published research and introduction to the Reflexive Thematic Analysis Reporting Guidelines (RTARG). Palliat Med. 2024:2692163241234800.
12. Braun V, Clarke V. Is thematic analysis used well in health psychology? A critical review of published research, with recommendations for quality practice and reporting. Health Psychol Rev. 2023;17(4):695-718.
13. Zoll PM, Linenthal AJ, Gibson W, Paul MH, Norman LR. Termination of ventricular fibrillation in man by externally applied electric countershock. N Engl J Med. 1956;254(16):727-32.
14. Lown B, Amarasingham R, Neuman J. New method for terminating cardiac arrhythmias. Use of synchronized capacitor discharge. JAMA. 1962;182:548-55.
15. Stiell IG, Callaway C, Davis D, Terndrup T, Powell J, Cook A, et al. Resuscitation Outcomes Consortium (ROC) PRIMED cardiac arrest trial methods part 2: rationale and methodology for "Analyze Later vs. Analyze Early" protocol. Resuscitation. 2008;78(2):186-95.
16. Soar J, Nolan JP, Bottiger BW, Perkins GD, Lott C, Carli P, et al. European Resuscitation Council Guidelines for Resuscitation 2015: Section 3. Adult advanced life support. Resuscitation. 2015;95:100-47.
17. Ludhwani D, Goyal A, Jagtap M. Ventricular Fibrillation. StatPearls. Treasure Island (FL)2021.
18. Perkins GD, Lockey AS. Defibrillation-Safety versus efficacy. Resuscitation. 2008;79(1):1-3.
19. Gibbs W, Eisenberg M, Damon SK. Dangers of defibrillation: injuries to emergency personnel during patient resuscitation. Am J Emerg Med. 1990;8(2):101-4.
20. Cheng A, Magid DJ, Auerbach M, Bhanji F, Bigham BL, Blewer AL, et al. Part 6: Resuscitation Education Science: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2020;142(16_suppl_2):S551-S79.

21. Derinoz-Guleryuz O, Uysal-Yazici M, Udurgucu M, Karacan C, Akca H, Ongun EA, et al. The skills of defibrillation practice and certified life-support training in the healthcare providers in Turkey. Int J Clin Pract. 2021;75(12):e14978.
22. Dwyer T, Williams LM, Mummery K. Nurse-initiated defibrillation? Reality or rhetoric. Nurs Crit Care. 2007;12(6):270-7.
23. Tai CK, Cattermole GN, Mak PS, Graham CA, Rainer TH. Nurse-initiated defibrillation: are nurses confident enough? Emerg Med J. 2012;29(1):24-7.
24. Janatolmakan M, Nouri R, Soroush A, Andayeshgar B, Khatony A. Barriers to the success of cardiopulmonary resuscitation from the perspective of Iranian nurses: A qualitative content analysis. Int Emerg Nurs. 2021;54:100954.

Appendix 1: Ethics Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research and Innovation)

TO: Dr JI Osawe
School of Clinical Medicine
Department of Medicine
Division of Emergency Medicine
Medical School
University

E-mail: joe_osawe@hotmail.co.uk

CC: Supervisor: Drs LP Chadinha and P Saffy
<louischadinha@gmail.com>
and <HREC-Medical Research Office@wits.ac.za>

FROM: Mr Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

DATE: 2022/12/06

REF: R14/49

PROTOCOL NO: **M220906** (This is your ethics application reference number. Please quote it in all enquiries, oral or written, relating to this study.)

PROJECT TITLE: *Knowledge, attitude and practice of defibrillation amongst medical doctors and nurses in the emergency department at a tertiary teaching hospital in Johannesburg*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to Government funding of the University.

MSWorks2000/Iain0007/Clearscan.wps

Appendix 2: Data Collection Sheet

Questionnaire on Knowledge, Attitude, and Practice of Defibrillation

MARK “X” or ENCIRCLE THE OPTION(S)

DEMOGRAPHICS

1. Gender
    a. Male
    b. Female
    c. Other
2. Job description
    a. : Professional nurse
    b. Enrolled nurse
    c. Medical Intern
    d. Community service doctor,
    e. Medical Officer
    f. Registrar
3. Have you attended an ACLS course in the last two years?
    a. Yes
    b. No
4. If yes, when?
    - _____

5. Have you had any other training in using a defibrillator?
    a. Yes
    b. No
6. If yes, please describe the training you have had _____
7. How many years have you been working in the emergency department?
    a. < 1 year
    b. 1 – 2 years
    c. 3 – 5 years
    d. > 5 years

KNOWLEDGE

8. Is there a defibrillator in the Emergency department?
    a. Yes
    b. No
    c. Don’t know

9. Do you know where the defibrillator is in the emergency department?
    a. Yes
    b. No
    c. Don’t know

10. If yes, detail _____

11. Are daily defibrillation tests done?
    a. Yes
    b. No
    c. Don’t know

12. Who does the above?
    a. Professional nurse
    b. Enrolled nurse
    c. Medical Intern
    d. Medical Officer/ community service doctor,
    e. Registrar
    f. Don’t know

13. Have you used a defibrillator before?
    a. Yes
    b. No

14. If yes, when was the last time you used it?
    - _____

15. If yes, how many times in the last year?
    a. None

b. Once
c. 1-5 times
d. 5-10 times
e. >10 times
f. Do not recall

16. If not, have you ever witnessed anyone using it on a patient?
    a. Yes
    b. No

17. What Joule setting do you use for the first defibrillation of an adult patient with the defibrillator available in the Helen Joseph Hospital ED?

    a. _____
    b. Don't know

18. What are the indications for defibrillation? (Fill in all you know)
    a. _____
    b. _____
    c. _____

AWARENESS AND ATTITUDE

19. What is the type of defibrillator?
    a. Monophasic
    b. Biphasic
    c. Don't know

20. On a scale of 1-5, 1 being the least and 5 being the most, what is your confidence level in using a defibrillator?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5

21. If a defibrillator is available, would you use it on your patient, if appropriate?
    a. Yes
    b. No
    c. Don't know

22. If no or don't know, reason

    Mark all that apply with an "X." or encircle

    a. Insufficient knowledge

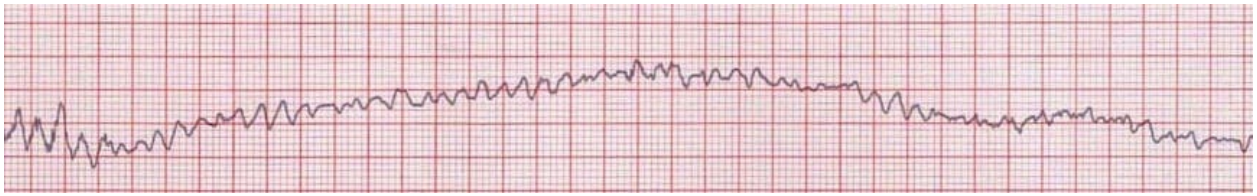
b. Fear of harm to the patient
c. Fear of self-harm

23. Do you think all hospital departments should be equipped with a defibrillator?
    a. Yes
    b. No
    c. Don't know
24. If yes: why? _____
    _____
25. If No: why? _____
    _____

PRACTICE

26. Your department is equipped with a biphasic defibrillator; mark the location of paddles/pads in the picture with an "X."

27. An adult patient is in cardiac arrest; you start CPR and attach defibrillator paddles/pads to the patient the following rhythm is seen.



What would be the next best recommended action?

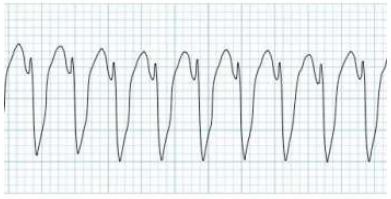
Mark only one with an “X.” or encircle

a. Defibrillate
b. Cardiovert
c. Give adrenaline 1mg IV bolus
d. I don’t know

28. Identify the rhythm in the question above, or state “don’t know” if you don’t know.

_____

29. An adult patient is in cardiac arrest; you start CPR and attach defibrillator paddles/pads to the patient, and the following rhythm is seen.



What would be the next best recommended action?

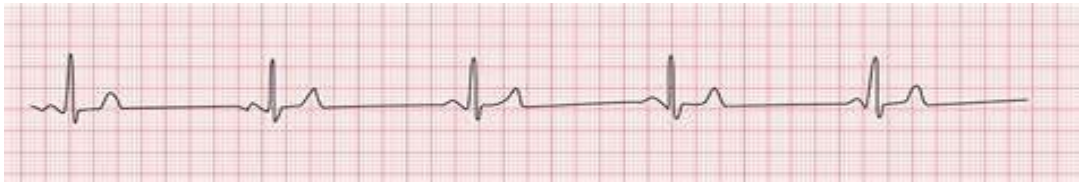
Mark only one with an “X.” or encircle

a. Defibrillate
b. Cardiovert
c. Give 1mg adrenaline IV bolus
d. Don’t know

30. Identify the rhythm in the question above, or state “don’t know” if you don’t know.

_____

31. An adult patient is in cardiac arrest; you start CPR and attach defibrillator paddles/pads to the patient, and the following rhythm is seen.



What would be the next best recommended action?

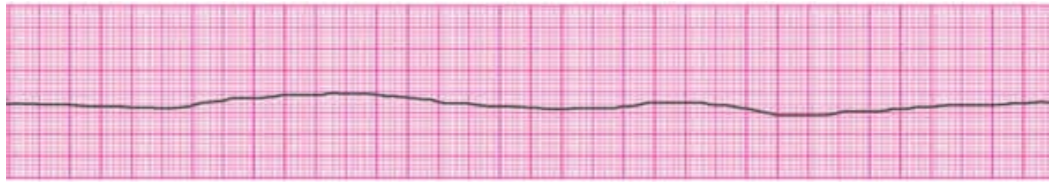
Mark only one with an “X.” or encircle

a. Defibrillate
b. Cardiovert
c. Continue CPR and give 1mg adrenaline IV bolus
d. Don’t know

32. Identify the rhythm in the question above, or state “don’t know” if you don’t know.

_____

33. An adult patient is in cardiac arrest; you start CPR and attach defibrillator paddles/pads to the patient, and the following rhythm is seen.



What would be the next best recommended action?

Mark only one with an “X.” or encircle

a. Defibrillate
b. Cardiovert
c. Continue CPR and give 1mg adrenaline IV bolus
d. I don’t know

34. Identify the rhythm in the question above, or state “don’t know” if you don’t know.

_____

35. What is the next recommended step after a defibrillation attempt?

Mark only one with an “X.” or encircle

a. Check the rhythm in the monitor
b. Determine whether the carotid pulse is present

c. Resume CPR, starting with chest compressions
d. Give rescue breaths
e. Don’t know

36. Which of the following is a safe and effective practice during defibrillation?

Mark ALL answer(s) with an “X.” or encircle

a. Stop chest compressions as you charge the defibrillator
b. Be sure oxygen is not blowing across the patient’s chest during the shock
c. Commandingly announce “all clear” before you deliver the shock
d. Assess for the presence of a pulse immediately after the shock
e. Don’t know

Appendix 3: Plagiarism Declaration

DEPARTMENT OF Emergency Medicine

School of Clinical Medicine, Faculty of Health Sciences,
7 York Road, Johannesburg 2193, South Africa

Plagiarism declaration for written work

I, Dr. Joseph Iziegbe Osawe (Student number: 1319501) am a student registered for MMed (Emergency Medicine) in the year 2021 at the University of the Witwatersrand declare the following:

- I am aware that plagiarism is the use of someone else's work without their permission and or without acknowledging the original source.
- I am aware plagiarism is wrong.
- I confirm that this written work is my own work except where I have stated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or if I have failed to acknowledge the ideas or writing of others.

Signature .....

Date 26th JANUARY, 2021

Appendix 4: Thematic analysis

Themes	Codes	Sample quotations
Lifesaving	• Lifesaving • Resuscitation • Mandatory	“Lifesaving” “It saves lives.” “To save the patient.” “Resuscitation” “Necessary part of resuscitation” “Needed in resuscitation.” “Emergency reasons” “Required for emergency readiness.”
Technical knowledge	• Rhythm Interpretation • Clinical Assessment • Management	“Defibrillation” “Cardiac arrest” “Shockable rhythm,” “Ventricular fibrillation”, “Ventricular tachycardia” “Mechanical pacing” “CPR”
Practical considerations	• Time-sensitive • Unpredictable onset	“Immediate attention” “Time is the heart.” “The earlier the defibrillation, the more likely to save a life.”

	• Unpredictable location	"Unpredictable when and where patients might collapse and arrest." "Patient may need a defibrillator anytime and anywhere." "Patient may need resuscitation in any area." "Patients can [present with] with shockable rhythms anywhere in the hospital." "Every minute, a shockable rhythm not shocked decreased survivability." "Never know when they will arrest." "Easy access," "Avoid running around the hospital looking for a defibrillator."
Pedagogical considerations	• Learning for self • Learning for team	"To gain more experience and learn more." "Increase in staff knowledge"

Thematic analysis of the reasons given for why all departments in a hospital should be equipped with a defibrillator.

Appendix 5: AFJEM Submitting Template

African Journal of Emergency Medicine

Submission template

Please structure your manuscript using the text and headings below for submission.

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<insert your abstract here>

Keywords

<insert 3-5 keywords here>

New page

African relevance

<insert 3-5 concise bullet points that convey the relevance of your work within the African context>

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<Reinsert your article title>

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Dissemination of results

<Provide a brief statement on how findings of this research were disseminated to the community from, or within which it was collected>

Example: Results from this study (research/ trail/ etc.) was shared with staff members at the data collection site through an informal presentation. The results were also published in the service's newsletter.

Authors' contribution

<Use the text in the example below to describe the proportional author contribution as per your author statement:>

Use this text as is

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content:

GM contributed 50%; WM 25%; and JR, RAR, RV, KP and DC contributed 5% each.

Use authors' initials only. Proportions must tally 100%

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All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of Competing Interest

<If no conflict, insert: "The authors declared no conflicts of interest.">

<If conflict, insert: "[describe conflicts]. The authors declared no further conflict of interest.">

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