AN ANALYSIS OF THE AFRIKAANS TELEPHONIC DESCRIPTORS OF CARDIAC ARREST IN A WESTERN CAPE EMERGENCY CONTROL CENTRE

By

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DECLARATION

I, Louis Chris van Rensburg, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever. I further declare the following:

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ABBREVIATIONS

ACLS:	Advanced Cardiac Life Support
AHA:	American Heart Association
ALS:	Advanced Life Support
CPR:	Cardiopulmonary Resuscitation
CVD:	Cardiovascular Disease
EMD:	Emergency Medical Dispatcher
EMS:	Emergency Medical Services
ePCR:	Electronic Patient Records
HIC:	Higher Income Countries
IHD:	Ischemic Heart Disease
LMIC:	Low-Middle Income Country
OHCA:	Out-Of-Hospital Cardiac Arrest
SA:	South Africa
tCPR:	Telephone Guided Cardiopulmonary Resuscitation
ROSC:	Return of Spontaneous Circulation
WC – EMS:	Western Cape Emergency Medical Services

PART A: Background and Literature Review

Introduction:

Out of Hospital Cardiac Arrest (OHCA) is a time-sensitive emergency (1). Globally it is estimated that only 10% of OHCA patients would survive, and the time it takes before cardiopulmonary resuscitation (CPR) is administered to a victim, has the greatest impact on survival (1,2). While Emergency Medical Services (EMS) are capable of treating OHCA, it has been shown that EMS staff struggle to meet response times, thus delaying the time to chest compressions (3).

The emergency call taker/emergency medical dispatcher (EMD) plays a vital role in OHCA, and they can directly influence the rate of survival in the cases of OHCA (4,5). Thus, thoroughly understanding the role of the call taker/EMD is of utmost importance as they can influence the resources dispatched to anybody requesting emergency medical services.

Low-Middle Income Countries (LMICs) face various barriers when trying to access healthcare and more specifically emergency care. These barriers have been identified in some African countries as Culture/community, Infrastructure, Communication/coordination, Transport, Equipment and Personnel (6). The above-mentioned applies to the South African context as well, but notable amongst these, a wide variety of cultures and languages are spoken in our country which poses additional challenges to healthcare providers and emergency services.

The study aims to probe the language barriers for one such representative community, in the Western Cape, South Africa. Finally, this information will be simultaneously contextualised to the South African setting, identifying gaps and the need for further research in this domain.

Literature review objectives

This literature review aims to:

A. Define Out of Hospital Cardiac Arrest
B. To determine the current epidemiology of Out of Hospital Cardiac Arrest and Cardiac related diseases.
C. Describe the best practice management of Out of Hospital Cardiac Arrest.
D. To review current local and international information about Out of Hospital Cardiac Arrest recognition by EMS call centres.
E. Identify current language descriptors that are known to describe Out of Hospital Cardiac Arrest and to contextualise them to one community in the South African setting.

Search Strategy

A Medline search was conducted via the PubMed database on 25 October 2019. The search was filtered into English and Afrikaans text only, not older than ten years (the year 2009). Studies included in this literature review are:

- Relevant to OHCA and pre-hospital cardiac arrest recognition.
- Speaks to telephonic cardiac arrest recognition and cardiopulmonary resuscitation instructions.
- Published within the last ten years
- Must have relevance to the overall purpose of the study

The following Medical Subject Headings were used as search strings in the advanced search option:

- Search one: (Emergency Medical Dispatch AND Out - of - Hospital - Cardiac Arrest AND South Africa)
- Search two: (Emergency Medical Dispatch AND Out - of - Hospital - Cardiac Arrest)
- Search three: (Out - of - Hospital - Cardiac Arrest AND South Africa)
- Search four: (Out - of - Hospital - Cardiac Arrest AND Africa)
- Search five: (Out - of - Hospital - Cardiac Arrest AND Afrikaans)
- Search six: (Call Centre AND Cardiac Arrest Recognition)

Due to limited results yielded on the PubMed search, a Google Scholar and National ETD Portal (a portal which collects theses and dissertations produced in South Africa) search using the same search strings was done; the same inclusion and exclusion criteria were utilised. Titles were scanned for relevance, and then the studies were included based on the relevance of their abstract. If the abstract did not hold any relevance to the topic, the articles were excluded.

The included articles' reference lists were scanned for any titles that might match the study, and the inclusion and exclusion were then applied again, through reading the abstract.

The review process depicted in the diagram below (Figure 1):

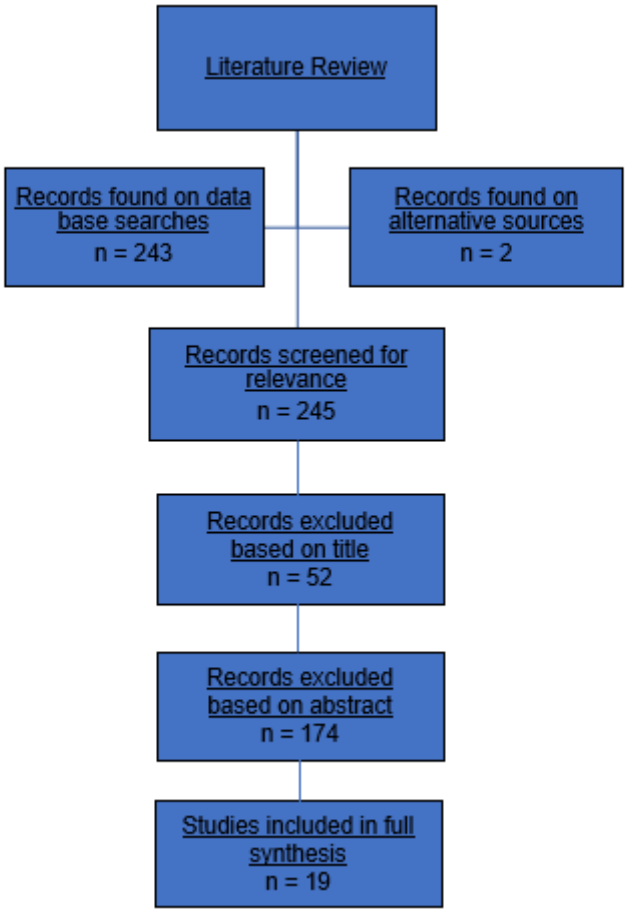


Figure 1: Literature review diagram

Background and Epidemiology of OHCA

OHCA is described as the sudden loss of mechanical cardiac function and the absence of systemic circulation in an out-of-hospital environment (7). OHCA is deemed a substantial public health burden due to its high morbidity rates and poor survival; this comes as a major concern as the prevalence of OHCA is on the rise (8).OHCA has been identified as an unpredictable, time-critical medical emergency which would inevitably result in death or neurological dysfunction if rapid treatment is not provided (9). To improve the OHCA survival rates, the American Heart Association (AHA) and other major bodies, have identified the OHCA chain of survival for patients suffering from cardiac arrest (10). The chain consists of five crucial links which would be discussed at a later stage, but ultimately it comes down to early recognition of cardiac arrest and early chest compressions.

Cardiovascular Disease (CVD) and Ischemic Heart Disease (IHD) are one of the biggest causes of OHCA; thus, a rise in the prevalence of these would equate to an increase in OHCA. Studies have shown that 60% of the deaths that are related to CVD's can be attributed to sudden cardiac arrest; thus, CVD is a major risk factor for OHCA (11).

The prevalence of CVD is on the rise worldwide. Africa is home to more than one billion people, thus making it a significant contributor to the global burden of CVD's (12). In 2013, CVD contributed to one million deaths in Sub-Sharan African, which amounted to approximately 5.5% of the global CVD deaths, and accounted for 11.3% of deaths in Africa (12,13). Currently, 17.3% of annual deaths in South Africa can be attributed to CVD (approximate to 1 in 6 deaths) (14).

The rise of OHCA, specifically in sub-Saharan Africa, could be attributed to the increase in cardiovascular diseases resulting from the rapid urbanisation occurring in low to middle-income countries such as SA (15,16). Apart from rapid urbanisation, many South Africans are from a historically poor socioeconomic background, and it has been shown to affect their lifestyle choices. Heavy alcohol consumption and unhealthy eating habits are common amongst the more impoverished population, which puts them at risk for developing CVD's (17). Other risk factors to cardiac arrest would be cardiac arrhythmias, Acute Myocardial Infarction (AMI), drug abuse and pulmonary embolisms.

Considering low to middle-income countries, there is an evident lack of data, but non-communicable diseases are on the rise in Africa and Sub-Saharan Africa. Cardiovascular disease contributed to 38% of all non-communicable disease-related deaths in Africa during 2013, reflecting a growing threat. Cardiovascular diseases are becoming a significant contributor to mortality, but the lack of accurate statistics makes it difficult to predict the

incidences. SImilalry, the epidemiology of cardiac arrest is unknown in Africa (13,18). Cardiovascular Disease (CVD) burden has increased significantly in sub-Saharan African and low-to-middle income countries, while historically, CVD only affected high-income countries.

Within SA, 68% of women are deemed obese, while 31% of men are overweight and obese. It has been reported that CVD is the second highest cause of death, with HIV and AIDS being the highest in SA (14,19). Statistics South Africa released its latest mortality figures in February 2019, where it has recorded 456 612 deaths in 2016, with 6 207 as a result of confirmed cardiac arrest; this made a total of 26.4 % of the cardiac-related deaths recorded in SA. Furthermore, 6190 deaths were recorded as ill-defined cardiac arrests “Ill-defined and non-specific causes of death are causes that are insufficiently detailed to be of value for public health purposes” (20). OHCA figures are also lacking in South Africa, and no database could be found reflecting these figures.

It is estimated that approximately 395 000 cases of OHCA occur in the United States, and that only 5.5 % of these cases survive neurologically intact to hospital discharge (21). When the prevalence of OHCA arrest is compared amongst first world countries, one finds that North America has the highest incidence of OHCA (54.6 per 100,000 persons per year), when compared to Australia (44), Europe (35), and Asia (28.3) (21). The majority of OHCA victims do not make it to a definitive healthcare facility, and this could be attributed to due to poor bystander CPR uptake (22). In a cohort of 57312 patients, with 9802 survivors; it has been shown that if CPR uptake is delayed for more than two minutes from the onset of cardiac arrest, only 14.7% would survive, compared to a survival rate of 17.1% in cases where CPR is initiated within two minutes of arrest. These results are also supported in other studies where it is shown that early bystander CPR contributes to a positive patient outcome (4,23).

A retrospective case review done by Stein et al. looking at outcomes of adult out-of-hospital cardiac arrest cases occurring in the greater Johannesburg metropolitan area, found that only 36% of patients that suffered OHCA received bystander CPR before EMS arrival (24). In 44% of OHCA victims which survived, all received early bystander CPR. Early bystander CPR has been associated with an increase in the survival rate of OHCA, and it increases the chances of full neurological recovery (24–26). The study also noted that the portion of OHCA patients that received resuscitation and regained ROSC was low when compared to international literature and this could be attributed to long response times.

OHCA may occur without any warning, but sometimes patients may present with shortness of breath, chest discomfort and general weakness. Patients in cardiac arrest would show no signs of life; thus, they would not have a pulse, no breathing effort (potentially some gasping) and a sudden loss of consciousness (27). It is therefore clear that cardiovascular disease and

cardiac arrest is a massive burden of disease and has a great impact on the worldwide population. Deaths related to OHCA could be reduced if one could improve EMS response and ensure timely management of the patient.

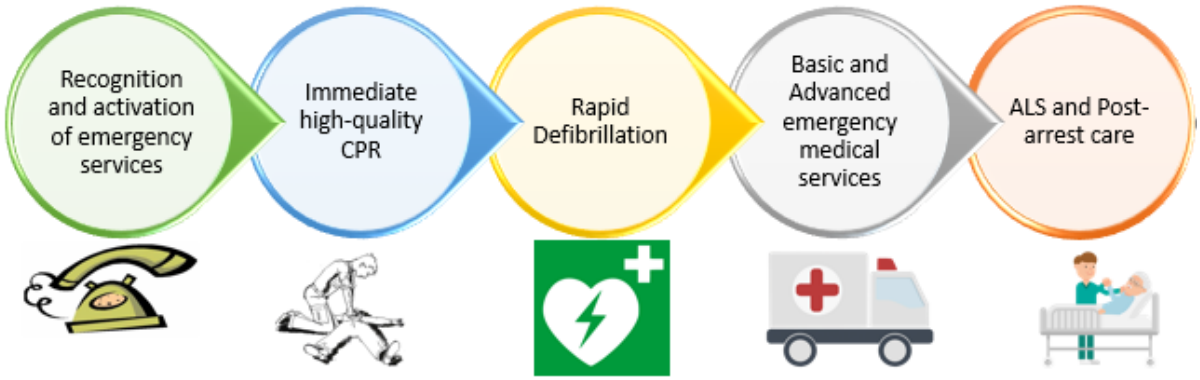
It is evident that the prevalence of OHCA is on the rise in Africa, and sub-Saharan Africa due to epidemiological transition, and to ensure the adequate management of these cases and prevent unfortunate deaths, the OHCA chain of survival needs to be implemented effectively within the South African context.

Literature review

Best practice recommendations

The time-sensitive nature of cardiac arrest has been well defined, and it has been demonstrated that the mortality and morbidity rates are affected by the time it takes to treat these individuals (4). In the out-of-hospital environment, EMS plays a significant role in the optimisation of care and the survival of such patients (17,18). To ensure an effective response to victims of cardiac arrest, Graham et al. identified five groups that need to work to, directly and indirectly, to influence patient outcomes (30). The groups involved in the management of these victims, whether direct or indirect, are the Public, Emergency Medical Services, Healthcare Systems, Researchers, Professional training and advocacy organisations (30).

The AHA has recognised the chain of survival (Figure 2, illustrated by author) for patients suffering from out-of-hospital cardiac arrest, considering the current epidemiology and to ensure preparedness for the eventual OHCA (31). The chain consists of five vital links namely Recognition and activation of the emergency response system, Early CPR, Rapid defibrillation, Basic and advanced emergency medical services, Advanced life support and post-cardiac arrest care (10,32).



(33)

Figure 2: Out of Hospital Cardiac Arrest Chain of Survival

The AHA makes recommendations based on levels and classes of evidence (Figure 3). Each of the links in the chain of survival discussed below is evidence-based, but the levels and classes of evidence supporting them differ.

Class I	Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of procedure or treatment
Class IIa	Weight of evidence or opinion is in favour of the procedure or treatment
Class IIb	Usefulness/efficacy is less well established by evidence or opinion
Class III	Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful.
Level of Evidence A	Data derived from multiple randomised trails
Level of Evidence B	Data derived from single randomised trails or non-randomised trails
Level of Evidence C	Expert opinion or case studies

(34)

Figure 3: Definition of classes and levels of evidence used in AHA recommendation

- Recognition of Cardiac Arrest and Emergency Response:

  Due to the time-sensitive nature of cardiac arrest, it is vital that the general public and emergency call takers recognise cardiac arrest as this would lead to a prompt response of adequate EMS resources and perhaps the initiation of Telephone-guided Cardiopulmonary Resuscitation (tCPR), and ultimately improved survival rates (29). It has been demonstrated that public recognition of cardiac arrest aids EMS call takers and dispatch centres greatly and in turn, the EMS call centre could assist by providing tCPR (Class I, LOE C-LD). However, public awareness of cardiac arrest and its recognition, could further be improved by public CPR awareness training, workshops, social media campaigns and public policy initiatives (8,31)

- Early CPR:

  In OHCA, it is seldom that EMS would be on-scene first, and instead it is often a layperson with no healthcare experience. Thus, it is for this reason that the AHA advocates hands-only CPR for victims receiving CPR by a sole provider, or a bystander (Class I, LOE C-LD) (35,36). It is believed that hands-only CPR increases the effectiveness of the chest compressions, especially when delivered by a layperson, as this reduces their cognitive load in an already stressed environment (31). To ensure

that CPR is done effectively, the layperson should aim for chest compressions at a rate of 100 to 120/min and a depth of at least 5 cm for an average adult (37).

- Rapid Defibrillation:

  The AHA advocates for early delivery of defibrillation if an Automated External Defibrillator (AED), or defibrillator is available. The AHA advocates for the availability of public AED's as this has demonstrated improved times to the first shock, and increased patient survival when compared to those who suffered OHCA, but who did not receive rapid defibrillation or had a delay in it (Class I, LOE C-LD) (31,38). The uptake of AED use amongst the layperson has also improved if they were familiar with the operation and location of publicly accessible AED's. Many higher-income countries (HIC's) have set up a policy to aid in locating these publicly accessible AED's (31,38,39).

- Basic and advanced emergency medical services:

  Resources sent to the scene of a pre-hospital emergency are mainly dependant on the information given by the caller and the information gathered by the call takers inquest (30,31). The AHA recommends that emergency call centres should recognise whether the patient is unconscious and has absent or abnormal breathing; if this is the case, it is safe to assume that the victim is suffering from cardiac arrest (Class IIa, LOE C-LD). The AHA hypothesised that dispatcher-assisted tCPR would improve the outcome of OHCA and an ILCOR systematic review found evidence supporting this (31,40–45). It is for this reason that emergency call centres should provide dispatch assisted hands-only CPR instructions until the arrival of EMS resources (Class I, LOE C-LD) (31). Without adequate resources to tend to OHCA patients, emergency medical services would not be able to render definitive care, leading to increased mortality (28).

- Advanced life support and post-cardiac arrest care:

  It has been demonstrated that patients are more likely to survive incidences of OHCA if all of the above are met in conjunction with good post-cardiac arrest care and definitive management (46). Every facility cannot provide adequate management to the post-cardiac arrest patient, and the quality of care delivered by the facilities is often affected by the availability of comprehensive treatment strategies, lack of a system that ensures well-coordinated transitions of care between providers, and variability in the quality of care across the various healthcare facilities available. Therefore, it is recommended that patients who regain Return of Spontaneous Circulation (ROSC) in the out of hospital environment be transported to a dedicated cardiac resuscitation

facility where possible, as this would directly affect chances of neurologically intact survival (Class IIb, LOE C-LD)(31). Definitive care for patients that suffered OHCA and regained spontaneous circulation, involves rapid Advanced Life Support (ALS) transport to a facility capable of Percutaneous Coronary Intervention, Targeted Temperature Management, Prognostication and Neurological Intensive Care (9).

Ultimately, the best practice management of OHCA would be if the bystanders and the EMS can timeously identify the presence of OHCA using emergency medical dispatch protocols at the time of the emergency call, one would be able to enhance the OHCA survival rate significantly (29). ALS EMS crews could deliver Advanced Cardiac Life Support (ACLS) resuscitation strategies, but ultimately it has been shown that good hands-on compressions and early defibrillation make the difference between life and death (36,39). With the importance of the OHCA chain of survival well demonstrated in the literature and above the section to follow would look at the implementation of the chain of survival within the South African setting.

The South African setting

South Africa is known to be unique when compared to other countries on the continent, and internationally, due to the vast cultural diversity; South Africa often gets referred to as the "Rainbow Nation" (47). Cultural diversity provides a rich history and can explain a lot of personal difficulties experienced amongst SA residents of different cultures, but it proves a challenge with the provision of healthcare and emergency medical services (48,49).

When the public seeks emergency medical assistance, they often contact the EMS via its emergency call centre. In South Africa, the public could dial 112 or 1077 to activate emergency medical services. Despite the universal number to access emergency medical services made available to the public, we still have challenges to obtain accurate information from the callers. SA has a population of 58,78 million and eleven official languages with isiZulu (spoken by 11,587,374) and isiXhosa (spoken by 8,154,258) the largest languages, while English (spoken by 4,892,623) is spoken at home by only one in 10 people (50,51).

Early recognition of cardiac arrest and rapid emergency response is recommended in the AHA chain of survival. In SA, the number of official languages along with the different levels of education and socioeconomic statuses poses a unique challenge to emergency call takers. When looking at the recognition of OHCA specifically, this would mean that we cannot rely on the internationally identified English cardiac arrest descriptors. Within the Western Cape, 46.6

% of the population is Afrikaans speaking (2,889,246 out of 6,200,100 residents), which is 3.8% more compared to national statistics on Afrikaans language users, thus relying on the international descriptors of cardiac arrest would not be inclusive at all, and it could result in missing victims of OHCA (52). Thus, the journey of an OHCA patient would ideally start within the emergency contact centre, but in SA where emergency call takers lack formal medical training, and most of the knowledge they have is gained through in-house training and experience, early recognition is unlikely. A national benchmark of 15 minutes before EMS arrival on scene for priority cases has been set by the National Department of Health and in comparison, to international counterparts in Europe and the USA, which range between 4 and 8 minutes for 90% of their priority cases, ours is quite modest (3). Despite our national benchmark, it is common that ambulances take longer than fifteen minutes to arrive at the scene of an emergency. OHCA being such a time-sensitive matter requires a prompt emergency response to avoid any delays in definitive care and to improve the chances of survival and full recovery. Various studies have been done surrounding EMS response times. Despite the significant push from national and provincial levels, these results are still not feasible which means that the majority of our priority emergencies do not get treated within 15 minutes of phoning the emergency medical services, and this poses a significant risk for the OHCA victim (3,24)

In a retrospective case review done by Stein et al. it was found that EMS had a median response time of 9 minutes in an urban setting and concluded that the EMS response times are significantly longer than reported elsewhere despite not measuring entire response time intervals, which again reiterates the importance of having early OHCA recognition by emergency call centre, and bystander's CPR and tCPR initiated, as this could increase the chances of survival for the OHCA patient (24,26).

Similarly to Stein et al. Finlayson completed a mixed-method study looking at emergency service response time in the KwaZulu Natal public emergency services where it was found that the median response time for all priority one emergency cases to be 41 minutes (53). This finding demonstrates a tardy EMS response and even more so, highlights the importance of early recognition of OHCA by the call taker. The initiation of early CPR is recommended in the chain of survival.

Another study completed by Stein et al. looking at outcomes of adult out-of-hospital cardiac arrest cases occurring in the greater Johannesburg metropolitan area, found that only 36% of patients that suffered OHCA, received bystander CPR before EMS arrival (24). In 44% of OHCA victims which survived, all received bystander CPR. Early bystander CPR has been proven to increase the survival rate of OHCA, and it increases the chances of full neurological

recovery (24–26). They also noted that the portion of OHCA patients that received resuscitation and regained ROSC and suggested that this could be as a result of long response times. However, a more extensive, prospective study on out-of-hospital cardiac arrest in Johannesburg is needed to confirm this. The study results are generalisable in our context and demonstrate the importance of bystander CPR and the rapid response to scenes of suspected cardiac arrest.

The SA government has acknowledged the importance of CPR and has introduced a national CPR week which runs yearly from 4 - 10 November, and this is aimed to spread public awareness of CPR and to improve CPR uptake in cases of OHCA (54). However, mass CPR campaigns are not a cost-effective solution in the LMIC context such as South Africa due to severely strained health budgets, which furthermore emphasises the importance of dispatch recognition of OHCA and the provision of tCPR (55,56).

Good quality early CPR had demonstrated to improve the survival of OHCA cases. However, in the South African setting, there is a massive shortage of paramedics available to serve the public (57,58). Veronese et al. conducted a descriptive study amongst intermediate qualified EMS personnel to compare demographic information, theoretical knowledge and psychomotor skills of the personnel in performing CPR (59). The study found that SA EMS staff provide substandard CPR quality which may negatively affect the survival rates of OHCA victims (59). The findings in the study, as mentioned above, raise concerns when considering the importance of good quality CPR and the influence it can have on the potential survival of OHCA victims as made clear by the AHA (31).

The next link in the chain of survival is rapid defibrillation. There is an evident lack of evidence in the South African context about public access automated defibrillators (AED); however, international literature has shown that public use of AED's is poor (39). Stein et al. also found that many patients could not be defibrillated by the time EMS arrived as they were not in a shockable rhythm. The fact that the patient was no longer in a shockable rhythm upon EMS arrival might be attributed to the long EMS response times experienced in South Africa (24).

The literature review did not provide any direct admission pathways ways for the post-ROSC OHCA patient. Anecdotally, EMS workers do not have any standing agreements with healthcare facilities regarding these patients, which furthermore puts the ROSC patient at risk for poor outcome. The availability and access to facilities that offer emergency Percutaneous Coronary Intervention (PCI) in cases of OHCA are limited and where possible accessing the facilities is nearly impossible due to a lack of medical insurance, proper referral networks or other system issues; thus meaning we are not able to provide definitive post -

ROSC care (60). South Africa also has a critical shortage of ICU beds which would make it nearly impossible for post-ROSC care to take place (61).

Taking into consideration the issues highlighted above, SA EMS have unique challenges to ensure that all the links as stipulated in the AHA cardiac arrest chain of survival are met.

The management of cardiac arrest victims, in general, is quite costly; thus, this would impact the ability of LMIC's to manage such patients effectively (59,60). In many instances, budgets allocated towards healthcare in LMICs, need to be used for the entire system and it would not be viable to push all funds towards the advanced management of cardiac arrest victims. Despite tight budgets, the rise of CVDs and the prevalence of OHCA in LMICs should not be ignored and it is for this reason that telephonic recognition and early bystander CPR may be one of the most feasible ways to improve the survival of OHCA victims.

Recognition of OHCA in EMS call centres

When the public seek emergency care for a potential OHCA victim, the EMS call centre (staffed with call takers and dispatchers) is generally the first point of contact with medical assistance (53). Thus, it is the call centre's responsibility to identify the OHCA promptly and provide the necessary instructions to allow for tCPR (29).

Various studies have been done worldwide, but locally there is a paucity of research on this topic. OHCA neurologically intact survival and functional ability are poor in general, but some countries such as United States, Europe and Australia have shown a significant increase in the survival of these patients (62–64). The increase in survival rates could be attributed to a well-designed EMS system, but mainly as a result of early recognition of OHCA, by the emergency call centre and the guidance to the bystanders to perform tCPR (65).

When calling the EMS contact centre it is the responsibility of the emergency call takers to identify the nature of the emergency and thus facilitate the dispatch of appropriate resources, and in suspected OHCA arrest this means call takers should rapidly identify cardiac arrest with a limited number of questions, and deliver clear and concise tCPR instructions to the bystander (29).

Emergency call centre personnel face various challenges when trying to identify these cases:

- Identification: The implementation of computer-aided call taking protocols is advocated and has demonstrated to increase the chances of call takers' OHCA recognition (66). Such call-taking protocols should not take up time and should aid the call taker in decision-making (67). Emergency call takers should also have adequate

training to ensure that they are capable of recognising various other emergencies (68,69).

- Prioritisation: The accuracy of call taking and call prioritisation is highlighted widely, as this would affect the type of resources sent to attend to the call and how quickly EMS attended, yet this has been found inaccurate in numerous studies (70). Newton et al. conducted a quantitative descriptive study in the province of KwaZulu-Natal, South Africa, looking at the appropriateness of emergency medical service responses over 72 hours, and they concluded a significant mismatch between the dispatched resources and actual patient need (71). The generalisability of the study results would be possible in our study, as the systems used for call taking within the Western Cape are similar, and anecdotally it has shown that call priorities rarely meet the needs of the case.
- Dispatch: Dispatch is highly dependent on the prioritisation of the emergency call as this would affect the type of resources dispatched to the scene and how timely the dispatch should occur. Within SA, this poses a challenge, as there is already a prolonged emergency response time and a shortage of adequate skilled paramedics (3,58).

Despite the implementation of standardised call-taking protocols in many countries across the world, there are still challenges and barriers to identifying OHCA, and these could be attributed to several factors. Alfsen et al. conducted an inductive thematic analysis of recordings of confirmed OHCA cases, and used investigator triangulation to strengthen the credibility of the study, and analysed the data using a hermeneutic approach (68). Alfsen et al. identified the callers' emotional state/proximity, physical proximity, and whether they do not have a medical professional background as barriers to the recognition of OHCA when phoning for an emergency ambulance. The study found that the recognition of OHCA is highly dependent on the caller's input, but in addition to the caller, they also noted that OHCA recognition might be hampered due to cognitive overload on the call takers (or EMD's), seeing that often they are responsible for the patient assessment, caller instructions and reassuring an emotionally affected caller (68). The generalisability of the study results is limited due to the small sample size, and in relation to the South African context, the results might not be entirely the same, due to the lack of English proficiency and a lack of a standardised emergency call-taking algorithms in our EMS locally.

In addition to the above, Meischke et al. completed a study where they identified the effect that language barriers would have on time to dispatch (69). They reviewed CAD (computer-aided dispatch) reports generated from 911 medical calls over three months. The study

identified that language barriers added to call centre improficiencies, by reviewing calls identified as having language barriers to non-language barriers calls. It demonstrated that language barriers would lead to a delayed dispatch (the effect of the language barrier on time to BLS dispatch was, on average, 33% longer and time to ALS dispatch 43% longer) and frequently resulted in the inappropriate resources being dispatched to aid the public (69). The results could be generalised but not be entirely compatible to the SA context as the emergency call takers in the study, were pre-trained to identify language barriers and noted them down, and the fact that the majority of the United States citizens speak English as a first language, unlike South Africa. There is a paucity of African literature on this topic, but language barriers would inevitably occur in SA, seeing that there are eleven official languages and a highly diverse SA society with multiple languages (49,72). Penn et al. conducted a study looking at language mismatch in emergency call-taking. They used a qualitative analytic framework based on conversation analysis. The study was conducted in a Western Cape emergency call centre, and 21 calls were analysed where language barriers or code (language) switching was evident. Despite language barriers being well-managed in this call centre they also concluded that language barriers would inevitably occur (72). In SA, it is not only the diverse cultures and languages that will affect our ability to recognise OHCA but the educational inequalities and different socio-economic statuses of the callers requiring emergency services, might have a negative impact (73). These inequalities might affect the ability of the callers to explain the condition of the patient adequately and potentially they might not understand any other language except their mother tongue, which will pose significant challenges to the emergency call centre.

A prospective observational study was done by Travers et al. in Paris to assess the provision of dispatcher-assisted cardiopulmonary resuscitation in the main French dispatch centre. The study assessed the accuracy of OHCA diagnoses by emergency call takers, and concluded that the main reason for not being able to recognise OHCA, is due to dispatcher/call takers not adhering to the call taking algorithm, too many emergency calls arriving within the call centre, the caller not being in proximity to the victim or the caller not realising the urgency of the victims condition thus not providing adequate information (74). It was also noted that the callers/bystanders could not adequately distinguish agonal breathing form regular breathing which also leads to 31% of OHCA being missed. The Western Cape EMS does not have set call taking algorithms. Travers et al's study results may be generalisable to SA, as the lack of such algorithms would increase the likelihood of EMS missing potential OHCA cases. In addition to the above, taking into consideration the lack of widespread public CPR programmes in SA, it is likely that SA callers also struggle to distinguish agonal breathing from regular breathing.

Dispatcher and call taker training/qualification also proved to be a factor influencing the capabilities of EMS to recognise OHCA, where it is shown that lesser qualified emergency call centre staff routinely performed poorly in recognition of OHCA when compared to nurses and paramedics in dispatch (75). Despite a lack of South African data, this would undoubtedly influence the ability of our emergency call centre staff anecdotally, as the majority get employed with no medical background.

Descriptors of OHCA made by callers when requesting EMS

In recent years, the time-sensitive nature of OHCA has been extensively focused on, and various studies have been done in order to identify how to increase the accuracy of emergency call centre OHCA recognition (4,8,75,76,76–79). Riou et al. recently completed a study which looked at linguistics used by EMS call centre agents when answering an emergency call (77). The study retrospectively analysed a random selection of confirmed OHCA calls received at the call centre of St John Ambulance Western Australia between 1 January 2014 and 31 December 2015. It focussed specifically on how linguistics can affect the efficiency of call-taking in cases of suspected OHCA. It has been found that the phrases used by emergency call takers can affect their efficiency, and in order for them to avoid that the caller providing lengthy narratives of the events prior the emergency call, they should use the present perfect tense during directed questioning, for example: “Tell me exactly what has happened.” This has shown to increase the likelihood of callers responding with a short narrative (77).

Furthermore, they also concluded that short, succinct phrases should be built into the call-taking algorithms used by emergency call takers as these are less likely to result in long narratives by the callers. The trustworthiness of this study is limited in that double coding did not take place, and the linguistic analysis was done by one researcher only, and none of the other researchers reviewed it. The study results would be applicable within our context but cannot be generalisable due to the different levels of English proficiency.

OHCA is known to be a traumatic experience for the bystanders and family members surrounding the victim (80,81). For this reason, it is often difficult for the emergency call takers to get accurate information from the callers and adds on the difficulty to diagnose OHCA. Gibson et al. found in a retrospective study, that specific terms “descriptors” are used by callers when calling a 999-emergency call centre in the UK. The study looked at 349 call recordings of confirmed OHCA cases and found that only 1.4% of callers used the actual term cardiac arrest to describe the events that took place. Furthermore, 64.8 % said the patient is unconscious, 61.9% the patient is not breathing adequately, and 48.8 % mentioned breathing is absent (82).

They found that OHCA descriptors vary significantly and are often dependant on colloquialisms. Some of the primary descriptors found are:

- Ineffective breathing
    - Do not know: “hard to tell.”
    - Slow Rate: “breathing every now and then.”
    - Irregular breathing: “taking the odd breath.”
    - Agonal breathing: “breathes a little stop.”
    - Noisy breathing: “gasping, gargling and sounds like they are dying.”

- Level of consciousness
    - Conscious: “awake, alert, he can hear us.”
    - Unconsciousness: “out of it, fainted, not with us.”
    - Fluctuating consciousness: “half and half awake, almost unconscious.”
    - Uncertainty: “I don’t know; it’s difficult to tell.”

Further studies done on this confirmed that a breathing assessment proved to be more accurate when trying to identify OHCA when compared to palpating for a pulse; they also added that it might cost valuable time and should be done as speedily as possible. Despite the English language descriptors for cardiac arrest being well demonstrated by the various studies, these are not generalisable to the SA context simply due to different levels of English proficiency amongst various South Africans and the varying levels of education (73). Derkenne et al. suggested that a “Hand-on-Belly (HOB)” technique could be used by emergency call takers to assess whether the patient is breathing by merely asking the caller to press on the patient's stomach and to confirm with them whether or not the abdomen is moving up and down. If less than seven breaths were counted in a 30 second period, they would activate the tCPR protocol. Following the implementation of HOB, the OHCA detection rate significantly and continuously increased, from 2012 (54%) to 2018 (93%). The HOB technique was

adopted with dispatcher training and the implementation of a standardised call taking algorithm (67).

Notably, the only study to identify direct quotes given by the callers upon requesting EMS assistance was the study done by Gibson et al. (discussed previously) (82). However, all of the studies exploring language descriptors used to describe OHCA when phoning for an emergency ambulance identified, the absence of breathing or agonal breathing being linked to OHCA cardiac arrest (76,78,83)

The role of the emergency call takers/ emergency medical dispatcher

Emergency call centre staff (dispatchers and call takers) are of utmost importance. Their importance stems from the fact that they are the first point of contact when the public requires emergency medical assistance (53). The call takers' role is in identifying the urgency of the case on hand and assigning the appropriate prioritisation, to enable the dispatcher to assign the appropriate resources to deal with the case promptly (29,84).

Despite the importance of these staff members, we still have varying levels of qualifications and skills amongst them and no set standard in South Africa exists. In a study done by Anest et al., the lack of training and a medical background amongst emergency call takers and dispatchers demonstrated to be a barrier to effective care delivery, and often it resulted in the wrongful resource allocation (85). Although anecdotal, historically emergency call centre staff in the South African environment required a basic medical background before getting a job in the emergency call centre, this has changed drastically over the last few years and resulted in the employment of non-medically qualified staff.

Call taker and dispatcher levels of training have shown to influence their ability to recognise and prioritise cases accurately, where the less qualified emergency call centre staff routinely performed poorly in recognition of OHCA when compared to nurses and paramedics in dispatch, but they also tend to take longer to complete call taking (75) Despite the benefits of highly trained emergency centre personnel one cannot forget the fact that South Africa is an LMIC, thus employing nurses and advanced paramedics within the emergency call centres would not be viable and too much of a financial burden. If this were implemented, it would also worsen the shortage of Paramedics in an already strained system.

Summary and conclusion

The current literature describes the time-sensitive nature of OHCA, and on an interim level, one could argue that the public and the EMS call taker have the greatest responsibility when EMS deals with cases of OHCA (29,67).

It is evident that identification OHCA is of utmost importance and is supported by the AHA chain of survival. If the public and the EMS emergency call centre can identify OHCA, one would be able to directly minimise mortality and morbidity rates as a result of OHCA. In addition to ensuring early good quality CPR, one would be able to ensure that the right resources reach the scene.

Although there is a paucity of literature in the South African setting related to OHCA in EMS call centres, varying levels of education and literacy, as well as the variety of languages spoken suggest that additional challenges are faced by role-players in this setting, and these factors may impact how callers describe these cases and how call takers interpret what is being said.

Literature supports and recommends the use of standardised OHCA algorithms to be used by emergency call centre staff and standardised call-taking systems which could guide the recognition of cardiac arrest. It has been demonstrated that a well-designed call taking algorithm might increase the likelihood of recognising OHCA thus will facilitate the initiation of CPR and ensure a proper EMS response in an efficient way.

In order to individualise such a call taking algorithm for the setting in which it is intended, the creation of a reference of terms and phrases used by Afrikaans callers to describe OHCA when seeking emergency medical assistance with the Western Cape Emergency Medical Services (WC-EMS) emergency call, will allow for efficient information exchange between the public caller and call taker. Thus, this study aims to identify the Afrikaans language descriptors used by callers phoning the WC-EMS for an ambulance where someone supposedly suffered from OHCA.

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PART B: Manuscript in Article Format

Title Page

AN ANALYSIS OF THE AFRIKAANS TELEPHONIC DESCRIPTORS OF CARDIAC ARREST IN A WESTERN CAPE EMERGENCY CONTROL CENTRE

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Abstract

Introduction: Out of Hospital Cardiac Arrest (OHCA) is a time-sensitive emergency which requires prompt identification and emergency care in order to reduce morbidity and mortality. The first step in managing OHCA is rapid identification by the emergency dispatch centre. Identification of such patients remains challenging in South Africa due to multiple languages and widely differing levels of education. This study aimed to identify the key descriptors (words and phrases) of OHCA used by callers speaking Afrikaans when contacting the emergency dispatch centre of the Western Cape Provincial Emergency Medical Services (WC-EMS).

Methodology: Computer-aided dispatch (CAD) data with a corresponding "*patient unresponsive"* incident type was drawn for a 12-month period (January – December 2018). Corresponding patient care records were extracted to verify OHCA. The original voice recordings between the caller and emergency call taker at the time of the emergency were extracted and transcribed verbatim. Transcriptions were subjected to inductive, qualitative content analysis to the manifest level. Descriptors of OHCA in Afrikaans calls were coded, categorised and quantified.

Results: A total of 729 confirmed OHCA cases were identified, of which 36 (5%) were in Afrikaans and eligible for analysis. Following content analysis, six distinct categories were identified. The most prevalent categories were descriptors related to Respiratory Effort (apnoea and difficulty in breathing; 28.1%), Clinical Features (related to the eyes, mouth and body temperature; 21.2%) and Cardiac Activity (pulselessness; 16.5%).

Conclusion Afrikaans Callers within the Western Cape province of South Africa use consistent descriptors when requesting an ambulance for OHCA. Future studies should focus on describing descriptors for other languages commonly spoken in the province, and to develop and validate telephonic OHCA recognition algorithms.

Keywords:

Out of Hospital Cardiac Arrest; Emergency Medical Dispatch; Call Centres; Emergency Call Taker; Telephonic Cardiopulmonary Resuscitation; Afrikaans

Key Messages

What is already known on this subject

- OHCA is a time-sensitive and life-threating emergency that requires prompt recognition and early bystander CPR in order to decrease mortality and morbidity.
- Recognition of OHCA by dispatch personnel has been found to increase the rates of early bystander CPR with improved outcomes.
- Recognition of OHCA is entirely based on the descriptors that callers provide when seeking emergency medical assistance.
- Internationally, literature has shown that specific phrases are used more often than others; however, these phrases are mostly in English and originate from higher-income countries.
- No such literature exists for the South African context where 11 official languages and different levels of education is the norm.

What this study adds

- We provide descriptors of OHCA for a sample of Afrikaans calls, in the Western Cape province of South Africa. This corresponds to almost half of all residents in this province.
- A reference of terms and phrases used by the Afrikaans caller within the Western Cape when describing OHCA, tailored to specific settings, can aid dispatching decisions. This would ultimately allow one to develop a generic call taking algorithm for OHCA victims.

Introduction

Cardiovascular disease (CVD) prevalence has been on the increase and could be attributed to the rapid urbanisation occurring in low to middle-income countries such as South Africa (SA) (1,2). Apart from rapid urbanisation, many South Africans are from a poor socioeconomic background, and it has been shown to affect their lifestyle choices, which frequently leads to heavy alcohol consumption and unhealthy eating habits, which puts them at risk for developing CVDs (3). Within South Africa, 68% of women are deemed obese, while 31% of men are overweight and obese. It has been reported that CVD is the second highest cause of death, with HIV and AIDS being the highest in SA. (4,5). CVD and IHD are one of the biggest causes of OHCA; thus, the incidence of PHCA is also likely to rise.

Cardiovascular diseases still remains the leading cause of OHCA and accounts for approximately 80% of cardiac arrests (6). Out-of-Hospital Cardiac Arrest (OHCA) is a time-sensitive emergency which requires prompt recognition and management as the slightest delay is associated with increased mortality (7,8). Without prompt management, it can lead to severe disability or death. Early bystander cardiopulmonary resuscitation (CPR) has shown to increase the neurologically intact survival of patients (9,10).

About 90 % of patients who experience OHCA die before reaching the hospital and this could be attributed to poor bystander CPR uptake (11,12). In a Johannesburg-based study done by Stein et al. on OHCA, only 36% of patients who suffered witnessed cardiac arrest received bystander CPR (13). In 44% of OHCA victims that survived, all received early bystander CPR. Early bystander CPR has shown to increase the survival rate of OHCA, and it increases the chances of full neurological recovery (13,14). The survival of OHCA is very much dependant on early bystander CPR and a rapid response from the emergency services. Within SA it is typical that an ambulance can take longer than five minutes to arrive at the scene of an emergency (13,15). Again this reiterates the importance of having early bystander CPR initiated, as this could increase the chances of survival for the OHCA patient (16).

Although bystander CPR increases the chances of survival in OHCA, the uptake remains poor (17,18). The initiation of bystander CPR is poor due to many factors: fear of causing more harm, lack of confidence, the visible presence of blood or vomitus and being unsure as to whether CPR should be attempted (17). The poor bystander CPR uptake has led to international research which further suggested that telephonic recognition of cardiac arrest by the emergency call centre agent and telephonic cardiopulmonary resuscitation (tCPR) guidance, can improve the uptake of bystander CPR in OHCA, and thereby affecting the outcome (16).

One necessary step in order to facilitate tCPR is the prompt identification of OHCA by call centre agents. Recognition is solely based on the descriptors used by callers when describing their emergency situation as well as directed questions posed by the call centre agents (19). Emergency call takers within South Africa are faced with unique challenges such as diverse cultures, different socioeconomic statuses, varying levels of education and literacy, and 11 official languages (20–22). Within the Western Cape, 46,6% (2,889,246 out of 6,200,100 residents) of the population is Afrikaans speaking thus relying on international language descriptors of cardiac arrest might not be relevant or appropriate, resulting in missed OHCA recognition. (23). Thus, determining how Afrikaans-speaking callers describe OHCA might help in developing an algorithm for recognising OHCA when calling for an emergency ambulance in Afrikaans.

Currently, there is no published literature detailing the Afrikaans descriptors (keywords and phrases) that residents of the Western Cape use to describe OHCA when calling the Western Cape emergency control centre. The current study aims to determine this.

Methodology

A descriptive, retrospective qualitative study was performed to identify OHCA descriptors (keywords and phrases) used by Afrikaans callers when calling for an emergency ambulance within the Western Cape. After verbatim transcription, inductive content analysis to the manifest level was performed.

Study setting

The study was conducted within the Western Cape Government (WCG) emergency medical services (EMS) emergency contact centre. WCG EMS is a provincially funded service and renders emergency care to all residents within the Western Cape Province. The WCG EMS call centre handles approximately 2000 calls per day and 65 000 calls monthly. In the emergency call centre, emergency call takers receive an emergency call from residents of the Western Cape requiring an ambulance. Emergency call takers are most often the first point of contact between members of the public and emergency services. The latter are mostly non-medically trained personnel, whom upon appointment undergo orientation within EMS and receive in-house training on call-taking procedures and the computer-aided dispatch (CAD) system being utilised by WCG EMS.

Data collection

Computer-aided dispatch (CAD) data with corresponding non-trauma, "*patient unresponsive"* incident types were drawn for a 12-month period (January – December 2018). Thereafter, the corresponding electronic patient care reports (ePCR) were extracted to verify for OHCA.

OHCA was verified in several ways: Firstly, the ePCR data was first filtered according to their final prehospital triage code namely "Red" (very urgent, time-critical patients) and "Blue" (expectant or deceased). These cases were subjected to retrospective chart review.

OHCA was verified in cases with a final red triage code where patients were found to be unresponsive and pulseless, or CPR was initiated upon arrival of emergency medical services. Cases where cardiac arrest was not the presumed cause for unresponsiveness (e.g. stroke and hypoglycaemia) were excluded.

For cases with a final blue triage code, OHCA was verified where a declaration of death accompanied the ePCR record. All other cases were excluded as these cases are highly unlikely to indicate OHCA.

After screening, the original voice recordings of included cases were randomly selected, extracted and transcribed verbatim by the first author.

Data analysis

After transcription, the calls were subjected to inductive, qualitative content analysis to the manifest level, noting the Afrikaans descriptors used for OHCA within the Western Cape.

Keywords and phrases indicative of OHCA identified during content analysis were doubly (LvR and WS) coded and categorised using NVivo 12 (QSR International Pty Ltd, Australia) data analysis software.

The analysis took place following three steps Step 1: Developing and Applying Codes, Step 2: Identifying categories, patterns and relationships and Step 3: Summarizing and quantifying the data (24). With coding completed, emerging patterns have been identified by means of keywords being repeated in all of the data sets which have been coded and is related OHCA (24).

Qualitative Rigour

Qualitative rigour and trustworthiness were ensured by using a well-defined study methodology and further addressed according to the following headings, as outlined by Guba (25):

- *Credibility:* Credibility was ensured through prolonged engagement with the sampled data and investigator member checks between the investigators during debriefing sessions (26). An expert in the field of the Afrikaans language (JC) was also consulted to ensure the credibly of the descriptors identified (25). Furthermore, only cases of non-traumatic true OHCA were selected. Cases were further selected at random, until saturation. Unfortunately, saturation could not be confirmed due to a limited sample of Afrikaans calls.
- *Transferability:* The transferability of this study is limited to its setting in the Western Cape and is specific to the Afrikaans callers. Transferability can therefore not be determined.
- *Dependability:* Dependability was ensured by using an appropriate study design, data collection and analysis process. It enables readers to examine the methodology used to gather the data (26). An audit trail between the investigators has been kept.

- *Confirmability:* Transcription was performed by the investigators. Verification of transcription was also performed in order to ensure accuracy. Confirmability was further ensured through investigator triangulation by double coding of transcriptions.

Results

A total of 15 678 cases with corresponding non-trauma, *"patient unresponsive"* incident type, were identified. After excluding 15 642 cases for a variety of reasons (Figure 1), only 36 (5%) were in Afrikaans and thus included for analysis.

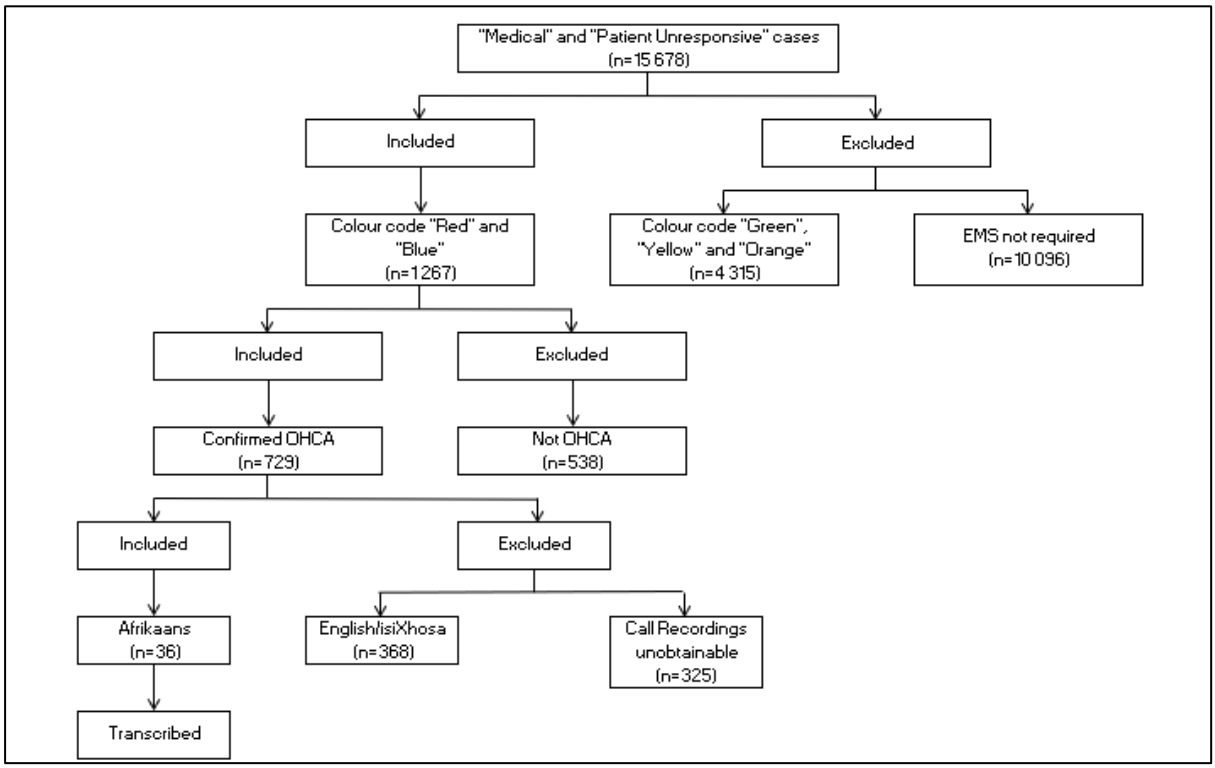

Figure 1: Data collection and extraction process

Basic demographic information for the patients included is presented in table 1 and is based on the data obtained from the ePCR. Patients were predominately male (n=24, 65%) with a mean age of 48.3 years for the entire sample. A total of 85 meaning units (descriptors) were identified from the 36 calls transcribed. The meaning units were then condensed into codes and six categories during the content analysis (table 2).

Table 1: Patient Demographics

	Total patients (n = 36)
Mean (SD) age (years)	48.3 ± 17.1
Male Sex; n (%)	24 (65 %)
Female Sex; n (%)	13 (35 %)

SD: Standard deviation

Table 2: Descriptors of OHCA used by callers

Category	Code	Meaning unit	English Translation
Respiratory Effort	*Apnoea*	"Voete, pols en asem daar gebeur niks"	“Feet, pulse and breathing nothing is happening”
		"Blaas laaste asem uit"	“Blew the last breath out”
		“Blaas ook niks asem uit nie”	“Not exhaling”
		“Daar is niks asemhaling nie”	“There is no breathing”
		“Dit lyk nie hy haal asem nie”	“Does not seem like he is breathing”
		“Haal nie asem nie”	“No breathing”
		“Haal nie asem”	“No breathing”
		“Hy haal nie asem nie”	“He has no breathing”
		“Lyk vir my die ou haal nie asem nie”	“Does not seem to me as if the guy is breathing”
		“Niks asem nie”	“No breathing”
		“Niks beweging van die bors wat op en afgaan, niks nie”	“No up and down chest movement, nothing at all”
		“Sukkel om asemhaling of ‘n pols te kry”	“Struggling to get a breathing effort or a pulse”
	Difficulty in Breathing	"Haal swaar asem"	“Breathing heavily”
		“Bors toe getrek”	“Chest closed up”
		“Baie, baie vlak asemhaling”	“Very, very shallow breathing”
		“Baie, baie vlak”	“Very, very shallow”
		“Ag, te vlak, baie vlak”	“Too shallow, very shallow”
Ill-Health	*Suspected diagnosis*	“vanoggend ‘n epileptiese aanval gekry”	“Had an epileptic episode this morning”
		“Dink soos sy ‘n stroke weg het”	“Think he had a stroke”
		“Dit lyk soos sy ‘n hartaanval gehad het”	“It appears she had a heart attack”
		“Hy besig om ‘n stroke te kry”	“He is busy getting a stroke”
		“Lyk soos sy ‘n stroke gehad het”	“Appears she had a stroke”
		“Ons dink sy’t ‘n stroke gekry”	“We think she had a stroke”
	Medical History	“Hy het verswak”	“He’s weakened”
		“Hy’t nou heeltemal verswak”	“He’s completely weak now”

Level of Consciousness	*Unresponsive*	"Collapse reageer nie” “Beweeg niks” “Bewusteloos” “Daars niks respons nie” “Dood” “Weet nou nie of hy lewe of wat nie” “Sy kan nie antwoord en sulke goed nie”	“Collapse not responding” “Not moving” “Unconscious” “There isn’t any response” “Dead” “Not sure if his alive or what” “She can’t answer and stuff like that”
Clinical Features	*Facial Descriptors*	“Sy oë is dood” “Skuim kom al by sy mond uit” “Skuim uit sy mond uit” “Daar kom skuim uit sy mond uit”	“His eyes are dead” “Foam is already coming from his mouth” “Foaming from his mouth” “There is foam coming out of his mouth”
	Body Temperature	"Sy’s yskoud" ''Haar hande is yskoud'' ''Hy is yskoud'' “Hy’s net yskoud" “Hy’s yskoud ons weetie” “Hy’s yskoud” “Koudterig” “Kouer as die res van die liggaam en...”	“She is ice cold” “Her hands are ice cold “He’s ice cold” “He is just ice cold” “He is cold we don’t know” “He’s ice cold” “Coldish” “Cooler than the rest of the body”
Cardiac Activity	*Pulselessness*	“Want ek’t gevoel daar’s nie meer 'n pols nie.” “Daar’s nie meer 'n pols by hom nie” “Geen pols” “Gevoel by sy arm ook, daar is ook nie ’n pols nie” “Nie meer pols skote” “Niks pols...” “Pols dood” “Pols Skote is net weg” “Sukkel om asemhaling of n pols te kry” “Sy het nie pols nie” “Voel nie 'n pols nie en hy reageer nie.” “Voete, Pols en asem daar gebuer niks”	“Because I felt there is no more pulse” “There is no more pulse” “No pulse” “Felt at his arm as well, there isn’t a pulse” “No more pulse” “No pulse” “No pulses” “No more pulses” “Struggling to get breathing effort or a pulse” “She does not have a pulse” “Not feeling a pulse and his not responding” “Feet, pulse and breathing nothing is happening”

English Descriptors	*Respiratory Effort*	“Breathing is shallow” “No breathing, no response” “Seem like his not breathing” “Short of breath” “They can’t get a breath” “Very short of breath” “Weak breathing”
	Clinical Features	“Body Cold” “Eyes is half open” “Eyes half open” “Fixed pupils” “Her body is ice cold” “His eyes are closed” “Mouth is skew”
	Level of Consciousness	“Found him this morning unconscious” “He doesn’t move” “He is not responding” “He is unresponsive” “No breathing, no response”
	Cardiac Activity	“I don’t feel any pulse nothing” “I felt for pols, for a pulse there is nothing”

Figure 2 shows the frequency with which descriptors were used. English descriptors used during the Afrikaans calls were also included and grouped with similar Afrikaans descriptors. The most prevalent categories were descriptors related to Respiratory Effort (apnoea and difficulty in breathing; 28.1%), Clinical Features (related to the eyes, mouth and body temperature; 21.2%) and Cardiac Activity (pulselessness; 16.5%).

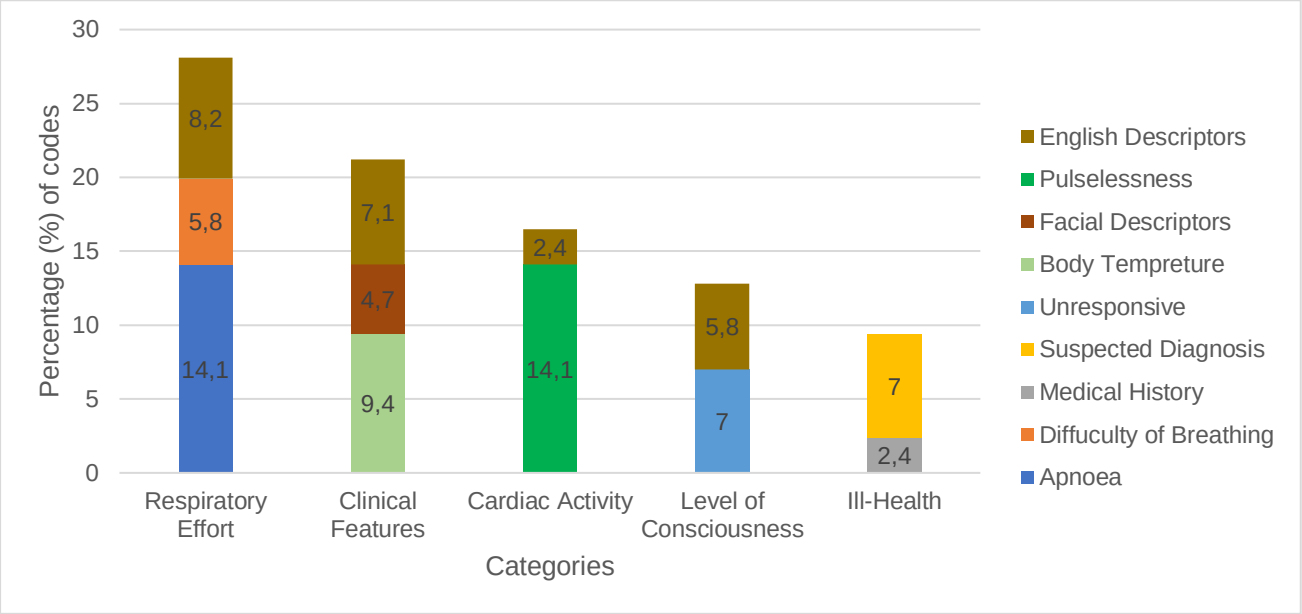

Figure 2: Descriptors used by callers to describe OHCA

Discussion

The manner in which callers describe their emergency to the EMS call centre greatly impacts on the emergency call taker's ability to correctly prioritise the case, and to ensure the correct resources are allocated and sent to the scene (27). OHCA requires prompt intervention from dispatch personnel to facilitate bystander CPR telephonically. The study aimed to identify the key descriptors (words and phrases) of OHCA used by Afrikaans callers seeking emergency medical assistance when calling into the emergency contact centre of the WC-EMS.

In this study, it was found that Afrikaans speaking callers described cardiac arrest most frequently in three ways using descriptors (words and phrases) linking to the following categories: Respiratory Effort, Clinical Features and Cardiac Activity.

Patients were most frequently described as not breathing whilst experiencing OHCA in our study. This finding is in keeping with international literature, where it has been demonstrated that abnormal breathing or no breathing is often associated with OHCA (19). A study by Gibson et al. suggested that only 1.4% of callers used the actual term *cardiac arrest* to

describe the events that took place, while 61.9% and 48.% of callers reported the patient as not breathing adequately, or mentioned that breathing was absent, respectively (28). It is recommended that dispatch personnel recognise OHCA by descriptors related to inadequate breathing because the accuracy of assessing for a pulse is questionable (11). Owing to the fact that the top descriptors for OHCA were related to breathing in our study, these recommendations could feasibly be implemented in the Western Cape province context and should therefore form the basis of telephonic OHCA recognition algorithms.

Secondly, callers described various clinical features of these patients who suffered OHCA. Interestingly the meaning units that were most prevalent in this category related to “foaming at the mouth” and “a skew mouth,” which are not classic descriptors of cardiac arrest. Upon analysis, it became evident that these meaning units identified were descriptors of the suspected diagnoses (stroke and epilepsy) made by the callers rather than actual OHCA itself. Of importance however, is that studies have demonstrated that bystanders are hesitant to perform CPR in instances where blood or vomitus is present (in particular, mouth-to-mouth). Current guidelines suggest hands-only CPR.

Descriptors related to Cardiac Activity (pulselessness), were also amongst the most frequent words or phrases for OHCA. Reasons for this are likely related to media exposure or lack of training (29). Detecting a pulse has been shown to be extremely challenging as laypersons and healthcare providers alike often do this with limited accuracy (29, 30). Due to this inaccuracy, guidelines recommend that bystander tCPR gets initiated in the presence of no breathing rather than pulselessness (11). This again seems feasible as up to a third of callers offered this information.

Despite Afrikaans being the home language of 46,6 % of the population in the Western Cape province, about a quarter of the cases still included English descriptors (23). Similalry, only 5% of the calls analysed were in Afrikaans, which highlights the everchanging multilingual nature of South African society. Afrikaans speakers used English phrases during their calls, utilising definite patterns in the way callers described OHCA that could still be identified providing a sample of how common code-switching is amongst Afrikaans-speakers (32). Penn et al. has shown that multilingual calls are managed effectively in most situations and the code-switching between various languages in their study was largely made seamlessly by EMS call takers. In some instances where Cape vernacular Afrikaans was used it was not always easy. Further research should investigate the OHCA descriptors when calls are in the Cape Afrikaans vernacular only (33).

Limitations and recommendations

The external validity/transferability of this study is limited by a small sample size of Afrikaans-only calls, in one provincial EMD call centre. Future studies should seek descriptors for other languages, study the effectiveness of teaching Afrikaans (to help create an awareness of Cape Vernacular Afrikaans) to EMS call takers who desire improved proficiency and include the private healthcare sector. In this study, only manifest content analysis was performed, and conceptual meaning was not ascribed to the descriptors.

The accuracy of these descriptors in isolation and in various combinations, to recognise OHCA should be determined. Hereafter, and notwithstanding our limitations of transferability, these descriptors should then be combined in an OHCA recognition algorithm for implementation.

Conclusion

Afrikaans Callers within the Western Cape province of South Africa use consistent descriptors when requesting an ambulance for OHCA. Producing recognition algorithms based on these descriptors could bolster the accuracy with which OHCA is identified, and thus tCPR can be initiated. Future studies should focus on seeking descriptors for other languages commonly spoken in the province, and to develop and validate telephonic OHCA recognition algorithms.

Acknowledgements

Western Cape Emergency Medical Services – For allowing the conduct of the study within the organisation and to access the required data to complete the study.

Trezinha Naidoo, Bradley Berling and Selwyn September – WC-EMS emergency call centre agents who assisted by gaining the necessary data and extracting the call recordings as required.

Contributors

LvR - Conceptualisation of the study, data collection, transcription, data analysis, interpretation, and manuscript preparation.

JC - Conceptualisation of the study, study design, data analysis and manuscript preparation.

WS - Conceptualisation of the study, study design, data analysis, interpretation, manuscript preparation.

Funding

This research project was funded privately & the Western Cape Emergency Medical Services granted protected research time for the author.

Conflict of interest

Authors in this study have no conflict of interest

Patient consent

The study was conducted retrospectively, and a waiver of consent was approved by the HREC. The ePCR's and voice recordings that were obtained were anonymised and stored in protected files.

Ethics Approval

University of Cape Town Human Research Ethics Committee granted ethics approval for the study (Reference number 459/2019).

Data sharing statement

Data for this study was formally requested via the National Health Research Database (NHRD) of the South African National Department of Health, following ethics approval. Data can be made available upon request, subject to approval by the NHRD.

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PART C: Appendices

Appendix A: Emergency Medical Journal: Instructions for Authors

The journal selected for publication is the Emergency Medicine Journal (EMJ), as the recommendations made in our study are applicable to an international audience, and open access is available.

The instructions for Authors can be found at the following link:

https://emj.bmj.com/pages/authors/

Appendix B: Research Protocol

An analysis of the Afrikaans telephonic descriptors of Cardiac Arrest (CA) in a Western Cape Emergency Control Centre

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This study is in partial fulfilment of the requirements for a Masters in Philosophy: Clinical Emergency Care

Declaration

I, Louis Chris van Rensburg, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

I authorise the University to reproduce for research either the whole or any portion of the contents in any manner whatsoever.

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1. I know that plagiarism is a serious form of academic dishonesty.
2. I have read the document about avoiding plagiarism, am familiar with its contents and have avoided all forms of plagiarism mentioned there.
3. Where I have used the words of others, I have indicated this by the use of quotation marks.
4. I have referenced all quotations and properly acknowledged other ideas borrowed from others.
5. I have not and shall not allow others to plagiarise my work.
6. I declare that this is my own work.
7. I am attaching the summary of the Turnitin match overview (when required to do so).

Signature: Signature Removed

Date: 22/05/2019

List of abbreviations used in the proposal

AHA:	American Heart Association
CA:	Cardiac Arrest
CAD:	Computer Aided Dispatch
CPR:	Cardiopulmonary Resuscitation
CVD:	Cardiovascular Disease
EMS:	Emergency Medical Services
ePCRs:	Electronic Patient Report Forms
IHD:	Ischemic Heart Disease
OHCA:	Out-Of-Hospital Cardiac Arrest
SA:	South Africa
tCPR:	Telephone Guided Cardiopulmonary Resuscitation
WCEMS:	Western Cape Provincial Emergency Medical Services

Purpose of the Study

Out-Of-Hospital Cardiac arrest (OHCA) is a time-sensitive emergency requiring early recognition, early cardiopulmonary resuscitation (CPR) and emergency service activation (1). Without prompt management, it can lead to severe disability or death. Early bystander cardiopulmonary resuscitation (CPR) has shown to increase the survival of neurologically intact patients (1,2)

The incidence of OHCA has drastically increased over the last few decades, and this is due to the increase in the prevalence of people suffering from cardiovascular disease (CVD). The increase in CVD could be attributed to the rapid urbanisation occurring in low to middle-income countries such as South Africa (3,4). Apart from rapid urbanisation, many South Africans are from a poor socioeconomic background, and it has been proven to affect their lifestyle choices ,which often times leads to heavy alcohol consumption and unhealthy eating habits, which puts them at risk for developing CVD's (5).

Delays in delivering effective and efficient CPR during cardiac arrest would increase the mortality and morbidity of OHCA (6). It has been proven that delay in prompt management would result in permanent patient disability or death (7). Early bystander CPR has shown to increase neurologically intact survival, thus reducing mortality and morbidity rates of OHCA. In a lot of OHCA cases bystander CPR uptake is poor, and this could be attributed, but not limited, to the fact that the lay person is not trained or not confident enough to assist (8).

Uptake of bystander CPR has been shown to improve when emergency call centre agents offer guidance on performing telephonic CPR (tCPR). However, this is dependent on the recognition of OHCA based on the information provided by the caller to the call-taker. Within South Africa (SA), there are unique challenges that influence emergency call taking, and this is due to a highly diverse South African society, with multiple languages, different levels of education and socioeconomic statuses. Within the Western Cape, 46,6 % of the population is Afrikaans speaking, which is 3.8% more when compared to national statistics, thus relying on English language descriptors of cardiac arrest would not be inclusive at all, and it could result in missing victims of OHCA (9). With being able to telephonically recognise OHCA and provide tCPR, one would be able to improve the patient's chances of survival, by providing early CPR and sending the appropriate resources to the incident.

This study seeks to describe the Afrikaans terms used to describe OHCA by callers phoning the Western Cape Provincial emergency contact centre. Through a retrospective review of electronic patient report forms (ePCRs), we will identify index cases from which original

emergency calls will be extracted and subjected to content analysis; to identify words and phrases used by Afrikaans callers to describe a patient that suffered from OHCA.

Background

Cardiovascular Disease (CVD) burden has increased significantly in sub-Saharan African and low-to-middle income countries, while historically, CVD only affected high-income countries. The drastic rise in the prevalence of CVD within these countries could be attributed to rapid urbanisation, unhealthy lifestyles and poor socio-economic statutes. Within South Africa, 68% of women are deemed obese, while 31% of men are overweight and obese. It has been reported that CVD is the second highest cause of death, with HIV and AIDS being the highest in SA. (10,11). CVD and IHD are one of the biggest causes of OHCA thus the incidences would rise.

OHCA is a time-sensitive condition, and the prompt management thereof can improve the chances of viable survival (1,7). According to Heart Disease and Stroke Statistics about 90 % of patients who experience OHCA die before reaching the hospital and this could be attributed to poor bystander CPR uptake(12). In a Johannesburg-based study done by Stein et al. on OHCA only 36% of patients who suffered witnessed cardiac arrest received bystander CPR (13). In 44% of OHCA victims which survived, all received early bystander CPR. Early bystander CPR has been proven to increase the survival rate of OHCA, and it increases the chances of full neurological recovery (13,14). In the South African context, it is common that ambulances take longer than five minutes to arrive at the scene of an emergency and in the study mentioned above they had a median response time of 9 min, which again just reiterates the importance of having early bystander's CPR initiated as this could increase the chances of survival for the OHCA patient (7,14).

Despite bystander CPR increasing the patient's chances of survival, the uptake of bystander CPR is poor. Bystander CPR uptake/initiation is poor due to several factors with the main ones being fear of causing more harm, lack of confidence, the visible presence of blood or vomitus and being unsure as to whether CPR should be attempted (8). Due to poor bystander CPR uptake internationally, further research has suggested that the telephonic recognition of CA by the call centre agent and tCPR guidance can increase the uptake of bystander CPR in the OHCA patients(15).

Bystander CPR uptake to an OHCA victim could be improved, if call centre agents can identify the OHCA and provide the necessary telephonic guidance to the caller. In order to improve

the survival rate of OHCA in SA, we would need to decrease the amount of time it takes from Cardiac Arrest (CA) to hands on the chest CPR and reduces our time to first defibrillation (16) Due to the language variation inside South Africa with regard to total population and those identifying English as their second language there are discrepancies and a need to identify descriptors in specific languages, and in this study, it will be Afrikaans.

Within the Western Cape, 46,6% of the population is Afrikaans speaking thus relying on international language descriptors of cardiac arrest would not be inclusive enough, and it could result in us missing out victims of OHCA (9). Thus, determining how Afrikaans-speaking callers describe OHCA might help in developing an algorithm for recognising OHCA when calling for an emergency ambulance in Afrikaans. There is a lack of literature available that describe key words and phrases used in South Africa by Afrikaans callers when calling for ambulance assistance in case of OHCA. Due to the incidences of OHCA becoming more frequent, it is of utmost importance that these telephonic descriptors get identified. It would enable us to provide better patient care in the form of CPR and which suggests that we will have higher bystander CPR uptake which in return should improve patient outcome in the OHCA cases, but this needs to be confirmed by further future research(15).

This study seeks to identify the descriptors of OHCA within the Afrikaans speaking community of the Western Cape when phoning for an emergency ambulance to the WCEMS emergency call centre.

Research Question

When calling into the emergency contact centre of the Western Cape Provincial EMS, how do, the Afrikaans callers describe OHCA when seeking emergency medical assistance?

Aim and Objectives

This study aims to identify the key descriptors (words and phrases) of OHCA used by Afrikaans callers seeking emergency medical assistance when calling into the emergency contact centre of the Western Cape Provincial EMS by way of inductive content analysis.

In order to address this aim, the objectives of this study are:

- To identify confirmed out-of-hospital cardiac arrest cases from electronic patient care records and the Computer Aided Dispatch (CAD).
- To transcribe the calls, and by way of inductive content analysis, identify the descriptors of OHCA used by Afrikaans callers into the emergency contact centre.

Study Methodology

Study Design

This is a retrospective, descriptive study using content analysis.

Characteristics of the Study Population

The study will be set within the Western Cape Government (WCG) Emergency Medical Services (EMS) emergency control centre, based on the Tygerberg Hospital premises within the provincial disaster management centre. WCG EMS is a provincially based service and renders emergency care to all residents within the Western Cape Province. EMS operates over 250 ambulances and renders primary emergency care, helicopter emergency services, inter-facility transport and rescue services (17). Emergency call takers are most often the first point of contact between members of the public and emergency services. The latter are mostly non-medically trained personnel, whom upon appointment undergo orientation within EMS and receive in-house training on call taking procedures and the computer-aided dispatch (CAD) system being utilized by WCG EMS.

Sampling Method

CAD data will be used to identify all emergency calls of a medical incident group with a corresponding patient unresponsive incident type for the twelve-month period (Jan – December 2018). From here we will then pull corresponding electronic patient care report (ePCR) data for all of the case reference numbers identified from the CAD database. The ePCR database will then be filtered to only include cases with a final triage colour code red and blue. All corresponding cases with a triage colour code green, yellow or orange will be excluded as these cases are highly unlikely to indicate OHCA. All identified ePCR cases with a triage colour code red and blue will then undergo a quick retrospective chart review. OHCA will be verified in all cases with a final triage colour code blue by identifying a corresponding declaration of death slip number. OHCA in all colour coded red cases will be verified if the chart review indicates that CPR was initiated upon arrival of the EMS crew. All case reference numbers with verified OHCA will then be included and corresponding voice recordings will be collected. The researcher will then perform a quick review on all recordings, excluding cases which were reported in any languages other than Afrikaans. Figure 1 represents the sampling method used. The first 50 Afrikaans speaking recordings will then be extracted and transcribed using ELAN transcribing software, and resampling would occur until saturation is reached.

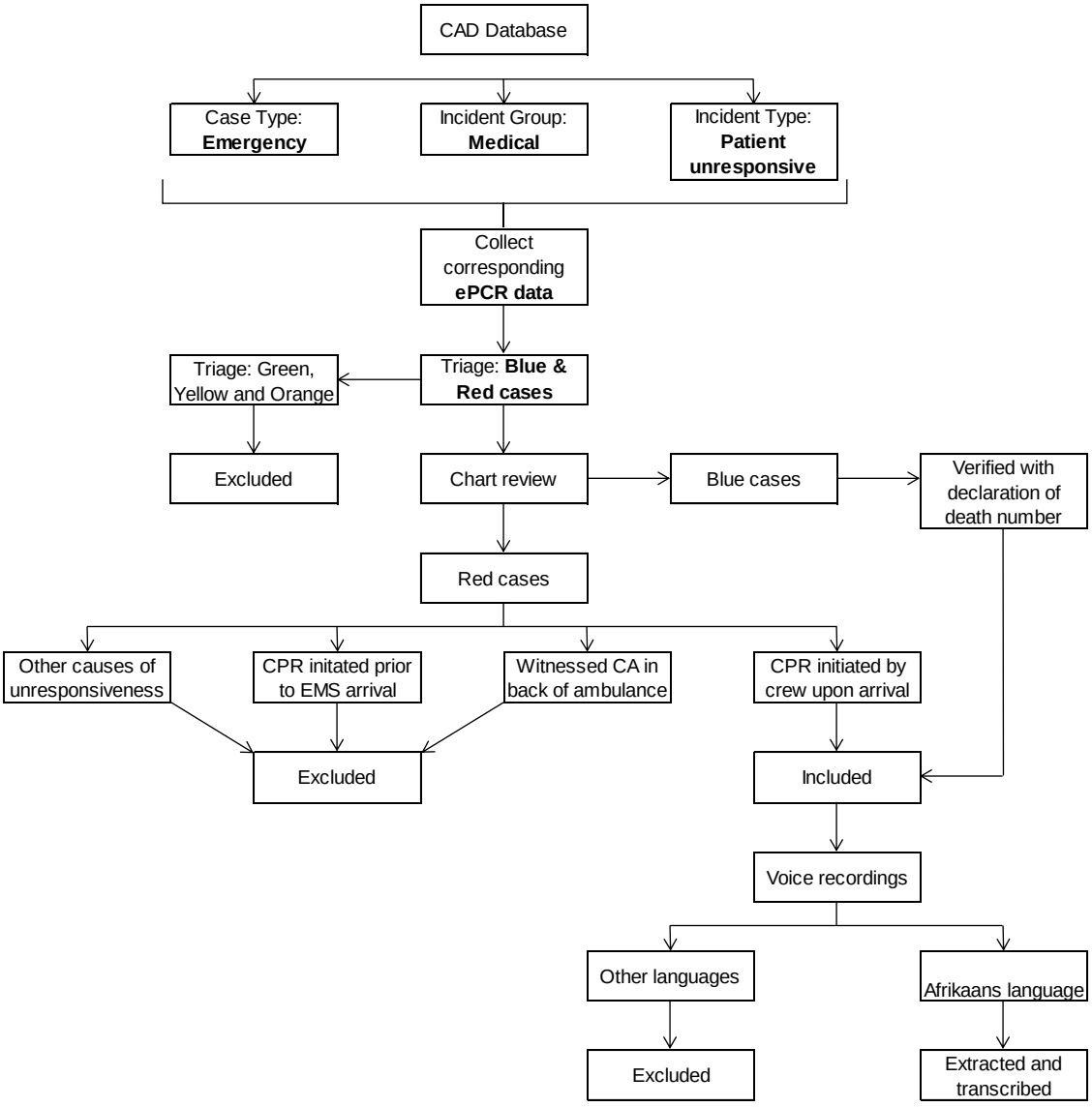

Figure 1. Sampling method

Inclusion Criteria

Cases will be included if they meet the following inclusion criteria:

- Primary Medical Emergency Cases with a registered incident type of patient unresponsive
- Cardiac arrest occurred prior to arrival of EMS
- CPR initiated upon EMS' arrival on scene
- Cases where patients were declared dead upon arrival

Exclusion Criteria

Cases will be excluded if they meet the following criteria:

- Inter-Facility Transports
- Cardiac arrest occurred whilst in EMS' care
- Cases in which OHCA could not be verified
- Calls not made in Afrikaans

Data Analysis

All transcribed data will be analysed primarily by the researcher, with supervisor assistance being provided if needed. Content analysis will be done inductively and to the manifest level which is in line with previously conducted studies within emergency control centres (18).
The data will be analysed using the following three steps Step 1: Developing and Applying Codes, Step 2: Identifying themes, patterns and relationships and Step 3: Summarizing the data (18). Step one would be done with ELAN computer software, which will be utilized to transcribe recordings. During organisation of raw data/call recordings, the researcher will make use of nVivo for content analysis and coding, which will result in condensed codes with categories that relate to each other. With coding completed, emerging patterns will be identified by means of keywords being repeated in all of the data sets which have been coded and is related OHCA.

Trustworthiness during this study would be ensured by using a well-defined study methodology which would not leave any uncertainties and further addressed according to the following headings;

- Credibility

Through prolonged engagement with the sampled data and researcher member checking between myself my supervisors (17). Experts in the field of language would also be consulted to ensure the credibly of the descriptors identified,

- Transferability

Transferability would not be assessed at this stage of the study as it is beyond the scope of this study. This would only be assessed when the call taking algorithm produced is subjected to use by the call takers in real world scenarios.

- Dependability

Dependability would be ensured by using a logically and clearly designed study methodology, data collection and analysis process. This would enable readers to examine the methodology used to gather the data (17). Furthermore, an audit trail between myself and the supervisor would be kept where necessary.

- Confirmability

Transcribed calls will be spot checked by my supervisor to ensure that the information transcribe is indeed true and reflects what happened during the call taking procedure.

Data Management

All data collected for this study will be kept on a password protected personal laptop and files would be backed up onto a password protected cloud, only accessible to the research team. The data collected from this study will be kept for the duration of six months post completion of the study, after which it will be deleted. Any hardcopies of data will be kept in a secure, locked cupboard and office at the WCG EMS offices in Bellville. Once data collection has been completed, all printed hardcopies of data will be destroyed by means of shredding.

The completed dissertation will be compiled and findings will be submitted to both the University of Cape Town open-access database (i.e. OpenUCT) and WCG EMS senior management.

Ethical Considerations

Risk and Benefits for participants

This study involves a retrospective review of WCEMS ePCRs and calls recordings. At WCEMS it is standard practice for an emergency call to be recorded and reviewed for quality assurance purposes and ePCRs get reviewed to ensure an acceptable standard of care is delivered by

ambulance personnel. Employees within the WCEMS are aware of these procedures; thus, their inclusion should not put them at any risk.

Seeing that I am an employee of WCEMS the possibility exists that I can identify the call takers voice during the transcription phase. However, this would be highly unlikely seeing that we have a large amount of control room operators taking emergency calls and we would not be transcribing any identifying data. Furthermore, the primary focus of this study pertains to that of the unidentifiable caller, rather than the call-taker.

The risk of identifying the families, patients and ambulance crews would be mitigated by anonymising the ePCRs before data collection; thus, the only information that would be available to the research team is whether the patient suffered OHCA.

The study is aiming to detect the Afrikaans language descriptors/key words of OHCA it could only be of benefit to the callers of the Western Cape EMS emergency call centre as this would improve call taker efficacy and would assure that the correct resources gets dispatched to assist the general public in need of an ambulance, when someone suffered OHCA.

Informed Consent Process

The aim is to identify the language descriptors of OHCA within the Afrikaans speaking community of the Western Cape when phoning for an emergency ambulance the WCEMS emergency call centre. When a call is made to the WCEMS emergency call centre, callers are informed that the call is recorded for quality assurance purposes.

It would be impossible to gain full consent from the caller, as this would be able in a real-world setting and might potentially hinder lifesaving service delivery to the patient on hand. The study is retrospective, so it would not affect the patient care delivered. Furthermore, the ePCRs and call recordings would be anonymised before and during transcription. For this reason, a waiver of consent is sought.

Privacy and Confidentiality

Privacy and confidentiality of all parties involved would be assured by anonymising the ePCR patient and caller details, where we would remove these fields from the database before extracting the data and all identifying details would also not be transcribed.

All the data collected would be kept on a password protected personal laptop by the researcher and files would be backed up onto a password protected cloud, and disposed of once the research has been completed.

Reimbursement for participation

Nobody would be reimbursed during this study, and no form of payment could be expected by the emergency contact centre personnel of the WCEMS.

Strengths and Limitations

The strength of this study is the fact that we would identify the Afrikaans language descriptors for OHCA, which would to enable future researchers to develop a standardised algorithm which can assist emergency call takers in making decisions and giving telephone guided CPR (tCPR). This is a first for South Africa, and in this, we hope to expedite the best possible care for the individual suffering OHCA and to improve their chances of survival by ensuring excellent and proper tCPR can be given before ambulance arrival.

This study results could be utilised by national 112 call centres, as well as private ambulance call centre, as they also receive a large number of calls whether it is originating from the Western Cape, or not.

Looking at Afrikaans language descriptors might be affecting the reach of the study, as the results could not be generalised to any other language, but the methodology could be used to research the same topic in other languages.

Dissemination of Findings

The complete dissertation would be compiled and findings would be submitted to the UCT open access database and WCEMS senior management.

Project timeline

2018/2019	April/May	June/July	August/September	October/November	December/January	February/March/April
EMDRC	X					
Ethics		X				
WCG Health Application & Facility Approval			X			
Data Collection				X		
Analysis				X	X	
Write Up						X

Budget and Funding

A layout of the estimated funds that would be required to fund this research projected are indicated in the table below:

Category	Cost
Travelling	R 2500.00
Printing (500 pages at 2 rand a page)	R 1000.00
Language Editing	R 3000.00
General (Calls, Data and WiFi)	R 1000.00
Total	R 7500.00

Travelling: The fund allocated here would be used to cover fuel for when I'm traveling to meet up the research supervisor and during the data collection phase to travel to and from the emergency call centre.

Printing: These funds is estimated, and it would cover the cost of printing the documents that would be required during my research and the printing of the final write up.

Language: Prior to final submission of the document it would be edited and scrutinised by a language professional which would incur some costs.

General: These funds are being made available to cover all unforeseen costs and to cover the day to day necessities that I would need during my research.

This study would be privately funded by the student himself, and no external finances would be used for the completion of this study.

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Appendix C: HREC Approval Letter

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room E53-46 Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: sumayah.arlefdien@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

09 July 2019

HREC REF: 459/2019

Dr W Stassen
Division of Emergency Medicine
F-51
OMB

Dear Dr Stassen

PROJECT TITLE: AN ANALYSIS OF THE AFRIKAANS TELEPHONE DESCRIPTIONS OF CARDIAC ARR3EST (CA) IN A WESTERN CAPE EMERGENCY CONTROL CENTRE. (MPHIL CANDIDATE: MR L VAN RENSBURG)

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 30 July 2020.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the student: - Mr Louis van Rensburg will also be involved in this study.

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

Signature Removed

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938

Appendix D: Western Cape Emergency Medical Services Approval Letter

Western Cape Government
Health

DIRECTORATE: EMERGENCY MEDICAL SERVICES
ENQUIRIES: Dr Shaheem de Vries
shaheem.devries@pgwc.gov.za
☎: +27 21 508 4523

ATTENTION: MR LOUIS VAN RENSBURG

RE: AN ANALYSIS OF THE AFRIKAANS TELEPHONIC DESCRIPTORS OF CARDIAC ARREST (CA) IN A WESTERN CAPE EMERGENCY CONTROL CENTRE

Dear Mr van Rensburg

Your request on the above matter refers.

Thank you for the request to conduct research within the Western Cape Government Emergency Medical Services. Your proposal has been evaluated by the Emergency Medicine Division Research Committee and has been recommended for approval by this office.

I am therefore pleased to inform you that such approval is hereby granted.

I wish you well in your endeavor and trust that you will keep this office and its department informed of your findings when these become available. I look forward to the insights that your research will afford us.

Yours sincerely

Signature Removed

Dr Shaheem de Vries
Head: Emergency Medical Services
Western Cape Government Health

Date: 13th August 2019

WCG Health: EMS – Office of Director, 11 Alexandra Road, Pinelands, 7405
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