Telephonic descriptions of out-of-hospital cardiac arrest by laypersons calling the dispatch centre of a private emergency medical service in South Africa

Stephanie Crause[1], Helen Slabber[2], Elzarie Theron[1], Willem Stassen[1,*]

[1]Division of Emergency Medicine, University of Cape Town
[2]Department of Emergency Medical Care, University of Johannesburg

[*]Corresponding author: willem.stassen@uct.ac.za, F51-62, Old Main Building, Groote Schuur Hospital, Faculty of Health Sciences, University of Cape Town, Observatory, 7925

ARTICLE INFORMATION

Received: 18 May 2023
Revision received: 28 June 2023
Accepted: 26 July 2023

Keywords:
Out-of-Hospital Cardiac Arrest
Emergency medical dispatch
Call centres
Emergency call taker
Telephonic cardiopulmonary resuscitation

ISSN:2709-3786

ABSTRACT

Background: The incidence of out-of-hospital cardiac arrest (OHCA) is expected to increase in South Africa. In order to encourage bystander cardiopulmonary resuscitation (CPR), international guidelines recommend call-taker recognition of the arrest and the initiation of telephone-guided CPR. One of the only ways that a call-taker can identify OHCA is through the description of the incident offered by the caller. The aim of this study was to identify the keywords and phrases that are used by callers to describe patients who are experiencing OHCA during calls made to a South African private Emergency Medical Service (EMS).
Methods: A qualitative exploratory design was used and employed inductive dominant content analysis to identify the keywords and phrases that are used by callers to describe patients who are experiencing OHCA during calls made to a South African private EMS. The initial sampling frame was all cases of the "Cardiac Arrest" incident type recorded between 1 January 2019 and 31 December 2019.
Results: A total of 28 call recordings were analysed. Keywords and phrases were organised into five categories: 1) Cardiac activity; 2) Level of consciousness; 3) Breathing descriptors; 4) Ill health; and 5) Clinical features.
Conclusion: Callers into a private emergency dispatch centre used consistent descriptors of OHCA, which were similar to those found in previous South African studies. Future research should focus on determining the accuracy of these descriptors to differentiate between OHCA and other conditions, and integrate them into OHCA recognition algorithms, call-taker training and telephone-guided CPR protocols.

Crause S, Slabber H, Theron E, Stassen W. Telephonic descriptions of out-of-hospital cardiac arrest by laypersons calling the dispatch centre of a private emergency medical service in South Africa. South African Journal of Pre-hospital Emergency Care. 2023; 4(1):2-6. doi:10.24213/4-1-5881

BACKGROUND

Owing to an epidemiological transition from infectious diseases to non-communicable and cardiovascular diseases, the incidence of out-of-hospital cardiac arrest (OHCA) is expected to increase dramatically in Africa.[1] In South Africa, the annual prevalence of OHCA ranges between 6.4/100 000 in Johannesburg[2] and 23.2/100 000 in Cape Town.[3] Return of spontaneous circulation (ROSC) rates have been reported to be as low as 1.3%.[3] One rea-

son for such low ROSC and survival rates might be a poor uptake of bystander cardiopulmonary resuscitation (CPR). Early bystander CPR is an essential component of the Chain of Survival, a set of interlinking steps to maximise OHCA survival with good neurological outcome.[4]

Telephone-guided CPR (tCPR), when a call-taker or dispatcher provides telephonic CPR instructions to a caller, has been shown to increase the willingness of bystanders to initiate and continue CPR until Emergency Medical Services (EMS) help arrives.[5] This is especially helpful in contexts like South Africa where mass public CPR campaigns are not established and might not be cost-effective.[6]

In order for call-takers or dispatchers to identify incidents of OHCA, they have to rely entirely on the way that the caller describes the situation. Previous work from the state sector in the Western Cape identified keywords and phrases that were used to describe OHCA in Afrikaans, English and isiXhosa,[7] the predominant languages in this province. This exploratory study sought to determine whether keywords and phrases might differ when investigated in a national dispatch centre, in the private sector. To this end, the aim was to identify the unprompted keywords and phrases that are used by callers to describe patients with presumed OHCA during calls made to a South African private EMS.

DESIGN & METHODS

Study Design

A qualitative exploratory design was used and employed inductive dominant content analysis to identify the unprompted keywords and phrases that are used by callers to describe patients with presumed OHCA during calls made to a South African private EMS. This work forms part of a larger project that sought to determine the barriers and facilitators to the initiation of telephonic CPR instruction for patients experiencing OHCA.

Study Setting

This study was conducted in the emergency dispatch centre of a national private emergency medical service in South Africa. In this dispatch centre, a generic script ("… what is your emergency?") is presented to every incoming call. In response to this question, the caller spontaneously offers a description of the situation. Based on this unprompted descriptor (keywords or phrases), a call taker then selects the incident type (in this case "Cardiac Arrest"), which provides further specific scripting. If not offered initially by the caller, the call-taker may then confirm presumed OHCA through interrogation of the caller for indicators of consciousness and signs of abnormal breathing. It is these initial unprompted keywords and phrases that were recorded and analysed for this study.

Sampling Strategy

The initial population was all cases of the "Cardiac Arrest" incident type recorded between 1 January 2019 and 31 December 2019. Cases had to denote unconsciousness, with abnormal breathing or pulselessness. The reason for selecting this sampling timeframe was to avoid COVID-19 related confounders in the main study. After identifying all cases of OHCA, anonymised case notes were exported to Microsoft Excel (Microsoft Excel, Microsoft Corp. Richmond, WA, USA) and shared by the private EMS. Using Excel, a random sample of cases were selected, and the corresponding audio recording of the original emergency call was retrieved and analysed. Sampling continued until data saturation occurred for the primary research aim (barriers and facilitators to telephonic CPR instruction). This occurred at 25 calls, a further 3 calls were analysed to confirm saturation. Data saturation was defined as informational redundancy.[8] Sampling was not limited by language used on the call.

Data Analysis

Inductive dominant content analysis to the manifest level was applied.[9] This was done by repeatedly listening to the audio recordings, making notes, and transcribing selected dialogue that contained meaning units relevant to the research question (keywords and phrases used to describe OHCA). Meaning units from transcripts were manually coded using Microsoft Excel (Microsoft Excel, Microsoft Corp. Richmond, WA, USA). Codes were grouped and collapsed to form categories. All categories underwent revision through researcher triangulation.

Qualitative rigor was ensured by employing the strategies of credibility (random sampling, double coding and researcher triangulation), confirmability (through increasing credibility and transparent reporting of code and category generation, including a coding tree, Table 1) and dependability (using established research methods and detailed reporting of the research process). Transferability may be limited due to the exploratory nature of the work and that it was conducted in a single private EMS.[10] However, a description of the setting and sample is provided in order for the reader to assess transferability to their own context.

Table 1: Categorical Development Process

Meaning Unit	**Code**	**Subcategory**	**Category**
"I have just lost my wife" – C11	Lost Wife	Suspected Death	Cardiac Activity
"She is not responding at all" – C2	Unresponsive	-	Level of Consciousness
"My mom, she's not breathing" – C5	Apnoea	-	Breathing Descriptors

Ethical Approval

The study was reviewed and approved by the Research Ethics Committee of the Faculty of Health Sciences at the University of Johannesburg (REC-1017-2021).

RESULTS

A final sample size of 28 call recordings were analysed. The average (range; mm:ss) length of calls was 03:30 (00:36 – 13:09). While it wasn't possible from the calls to determine true demographic details, we were able to establish the relation of the caller to the victim. In the majority of the cases the caller was a family member (n=18, 64.3%) or an acquaintance (n=4, 14.3%) of the victim. All sampled calls were made in English. A total of 66 codes describing keywords and phrases were extracted, which were organised into five categories. These categories were 1) Cardiac activity (n=25, 38%); 2) Level of consciousness (n=14, 21%); 3) Breathing descriptors (n=12, 18%); 4) Ill health (n=8, 12%); 5) Clinical features (n=7, 11

The most dominant category was "Cardiac activity" which described instances of pulselessness (n=7) (*"no pulse, no heartbeat, nothing at all"* – Caller (C) 2) or instances of suspected death (n=18) (*"I think my wife just died"* – C8).

The category "Level of Consciousness" organised descriptors related to unresponsiveness (n=8; *"we are not able to get her to respond"* – C6) or movement which mostly occurred together (*"she's not responding, she's not moving"* – C5).

"Breathing descriptors" categorised all instances where the caller noted that a patient was apnoeic (n=12). In this sample, apnoea was the only breathing descriptor noted. ("no breathing, nothing" – C2; *"She's not breathing or anything"* – C7; *"I think she stopped breathing"* – C18).

The category "Ill health" described keywords and phrases that relate to the medical history of the patient (n=4) (*"he's been sick for a while I'm not sure"* – C26) or where a suspected diagnosis of the problem is offered (n=4). In all instances, the diagnosis offered was "heart attack" (*"my husband is having a heart attack"* – C10; *"one of the ladies passed away or she got a heart attack or something"* – C14).

Least commonly, callers described the OHCA in terms of clinical features (n=7). Clinical features offered were related to temperature (*"I'm not sure if she stopped breathing, but she is still warm"* – C18), and other facial descriptors (*"he is blue in his face"* – C28; *"liquid coming out of her mouth and nose"* – C4; *"she's just lying there, eyes open"* – C22).

DISCUSSION

We sought to identify the unprompted keywords and phrases that are used by callers to describe patients with presumed OHCA during calls made to a South African private EMS. It was found that callers describe presumed OHCA using five distinct categories that relate to 1) Cardiac activity; 2) Level of consciousness; 3) Breathing descriptors; 4) Ill health and 5) Clinical features. By incorporating these descriptors into training and scripts, the ability of call-takers to quickly identify cardiac arrest and initiate telephonic CPR protocols can be improved.

The most common descriptors of presumed OHCA in this sample were related to cardiac activity, most notably, suspected death. This is similar to the findings of a recent study from the Western Cape province.[7] It would be interesting for future work to determine whether these descriptors could be related to prognosis, which could guide resource allocation and decisions to withhold resuscitation. Similarly, it would be helpful to determine whether this might affect the willingness of bystanders to intervene in situations where they have already accepted irreversible death of the victim. In this regard, it could have an impact on the development of tCPR protocols. Assessment of likely prognosis may also be guided by the descriptors of ill health that were offered by the callers. In this manner the call-taker could ascertain whether the current presentation is acute or whether a victim has had a long history of illness.

The second most common descriptor was related to level of consciousness and specifically unresponsiveness. This is in keeping with previous local[7] and international literature.[11] In the undifferentiated emergency patient, unconsciousness can

be caused by a variety of different disease processes or injuries. It should therefore not be considered as a defining feature of OHCA, but rather of a high acuity patient. Further interrogation should be initiated by the call-taker to ascertain the timing and circumstances surrounding the collapse. This information can then be used to determine the most appropriate emergency vehicle to dispatch, and the most appropriate pre-arrival instructions to be issued. Alternatively, this result could be explained by sampling bias because only cases denoted as "unconscious" were included.

Laypersons may incorrectly interpret agonal gasps as breathing,[12] which might result in delaying bystander CPR. It is for this reason that many international OHCA recognition algorithms recommend that reports of abnormal breathing or apnoea by a caller should be the entry point for the initiation of tCPR.[13] Agonal gasps have also been associated with improved neurologically intact survival, even in non-shockable presenting rhythms. When this is combined with a shockable rhythm, favourable neurological outcome increases 57-fold.[14] It was interesting to note that all breathing descriptors in our study related to apnoea, rather than abnormal breathing. Descriptions of apnoea also occurred more commonly than descriptors of pulselessness. This is encouraging as literature has reported poor accuracy of bystanders when assessing for a pulse in unconscious victims.[15]

The descriptors from this sample were also quite closely aligned to descriptors obtained from a provincial, public emergency dispatch centre.[13] This might start to challenge beliefs that important differences exist in the ways that private and public patients seek emergency care and describe chief complaints. It further makes a case for the development of national dispatch algorithms that can be implemented as a standard of care across the country. It also allows for standardised training of call-takers and dispatchers, regardless of where they will eventually take employment. Future research should test these assumptions across multiple contexts and emergency presentations.

Limitations

Transferability of this study to other contexts might be limited because the study was conducted in a single, private emergency dispatch centre. Only calls made in English were included because no calls of other languages were randomly sampled. Previous research noted that callers mostly choose to speak English even if it is not their first language,[7] and this might explain this result. Previous work also highlighted that descriptors of cardiac arrest in other languages, still resulted in common categories of descriptors, independent of language.[7] We therefore do not anticipate that this would have affected our results. True OHCA was not confirmed for the calls that were included, which would have required additional data collection from clinical patient report forms. Given that no instances of non-cardiac arrest were sampled, it isn't possible to determine the accuracy of these descriptors in differentiating OHCA from other conditions. Future studies should develop telephonic OHCA recognition algorithms for the South African context. Recognition should also extend towards the development of telephonic CPR algorithms.

CONCLUSION

Callers into a private emergency dispatch centre used consistent descriptors of presumed OHCA, which were similar to those found in previous South African studies. Future research should focus on determining the accuracy of these descriptors to differentiate between OHCA and other conditions, and integrate them into OHCA recognition algorithms, call-taker training and tCPR protocols.

FUNDING

This study was partly funded through a National Research Foundation of South Africa grant (Thuthuka Grant Nr 121971), held by WS.

CONFLICTS OF INTEREST

The authors report no conflicts of interest.

AUTHOR CONTRIBUTIONS

SC and HS collected, analysed and interpreted data and critically reviewed the final manuscript. ET analysed data and critically reviewed the final manuscript. WS conceived and designed the study, analysed and interpreted data and drafted and approved the final manuscript.

REFERENCES

1. Yusuf S, Rangarajan S, Teo K, et al. Cardiovascular risk and events in 17 low-, middle-, and high-income countries. New England Journal of Medicine 2014;371:818–27.

2. Stein C. Out-of-hospital cardiac arrest cases in Johannesburg, South Africa: a first glimpse of short-term outcomes from a paramedic

clinical learning database. Emerg Med J 2009;26:670–4.

3. Stassen W, Wylie C, rv T, Wallis LA. Out-of-hospital cardiac arrests in the city of Cape Town, South Africa: a retrospective, descriptive analysis of prehospital patient records. BMJ Open 2021;11:e049141.
4. Panchal AR, Bartos JA, as JG, et al. Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2020;142:S366–S468.
5. Maier M, Luger M, Baubin M. Telephone-assisted CPR. A literature review. Notf Rett Med 2016;19:468–72.
6. Bouland AJ, Risko N, Lawner BJ, Seaman KG, Godar CM, Levy MJ. The Price of a Helping Hand: Modeling the Outcomes and Costs of Bystander CPR. Prehosp Emerg Care 2015;19:524–34.
7. van Rensburg LC, Richmond L, Mgidi S, Claassen J, Wylie C, Stassen W. The lay descriptors of out-of-hospital cardiac arrest in the Western Cape province, South Africa. Resusc Plus 2021;7:100146.
8. Saunders B, Sim J, Kingstone T, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. Qual Quant 2018;52:1893–907.
9. Elo S, Kyngäs H. The qualitative content analysis process. J Adv Nurs 2008;62:107–15.
10. Shenton AK. Strategies for ensuring trustworthiness in qualitative research projects. Education for Information 2004;22:63–75.
11. Gibson JM, Jones SP, Hurley M, et al. Pp27 terms used to describe key symptoms in out-of-hospital cardiac arrest by people calling 999 emergency medical services: a qualitative analysis of call recordings to two uk ambulance services. 2017;34:e10–e10.
12. Eisenberg MS. Incidence and significance of gasping or agonal respirations in cardiac arrest patients. Curr Opin Crit Care 2006;12:204–6.
13. Fukushima H, Panczyk M, Hu C, et al. Description of Abnormal Breathing Is Associated With Improved Outcomes and Delayed Telephone Cardiopulmonary Resuscitation Instructions. J Am Heart Assoc 2017;6.
14. Debaty G, Labarere J, Frascone RJ, et al. Arrest. J Am Coll Cardiol 2017;70:1467–76.
15. Graham R, McCoy MA, Schultz AM, eds. Strategies to improve cardiac arrest survival: Time to act. Washington D.C.: National Academies Press, 2015:101–72.