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*Research Article*

# Enhancing Documentation of Out-of-Hospital Cardiac Arrests Through Acronym Expansions

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***Abstract***

*Out-of-hospital cardiac arrests (OHCA) represent a condition of significant public health concern. Very often, both the information and documentation for these cases are sub-optimal, limited and fragmented. This article seeks to propose a framework for the improvement of the quality of documentation within the Emergency Department by utilising acronym expansions, discussing the significance of proper, standardised documentation, the challenges faced and the potential benefits of utilising such cognitive aides.*

*This framework includes practical recommendations and examples for the implementation, which can potentially assist healthcare providers by enhancing information exchange, facilitating research, and ultimately improving the care and outcomes of OHCA patients.*

## Introduction

Cardiac arrests represent one of the most tense and high-stress situations in the Emergency Department. Cardiac arrest cases present several challenges to these frontline doctors when managing these cases. Being one of the most time-sensitive diagnosis, it requires prompt specialised intervention, swift action and decision making. Crucial events during this period involve the initial discovery of unresponsiveness (the cardiac arrest), the arrival of the emergency medical services (EMS) team, if there were bystanders present who helped with active resuscitation (bystander cardiopulmonary resuscitation), commencement of basic life support, any procedures (including airway manipulation) performed, rescue shocks provided, and any return of spontaneous circulation. **[**1-4**]** In addition to the medical dilemmas that arise from these events, documentation discrepancies are frequent and prevalent despite the advent of electronic medical records. **[**5**]** The Emergency Department at Singapore General Hospital sees an average of 20-30 cardiac arrest cases a month, which are reviewed regularly in departmental audits and peer-review sessions. This paper looks at the impact of the introduction of acronym expansions to improve documentation.

Accuracy of documentation is of paramount importance in every aspect of healthcare. Whilst survival is guarded in OHCA, complete and succinct documentation is essential for transition of patient care from the EMS to the Emergency Department and then to the inpatient setting for continuation of care, where relevant. The Singapore Medical Council Ethical Guidelines state that "medical records kept by doctors shall be clear,

accurate, legible and shall be made at the time that a consultation takes place, or not long afterwards. Medical records shall be of sufficient detail so that any other doctor reading them would be able to seamlessly take over the management of a case. All clinical details, investigation results, discussion of treatment options, informed consent and treatment by drugs or procedures should be documented". **[**6**]**

The concept of acronym expansions in the use of electronic medical records is not uncommon. **[**7**]** It helps to improve time spent and accuracy of transcription, the consistency across providers, accuracy, comprehensive reporting, enhance multi-disciplinary communication, and should be simple (not made too complex, especially with the time-dependence for cardiac arrest management) and user-friendly. The accuracy of the information documented can have downstream effects by care providers who have to make certain decisions pertaining to the care of specific cardiac arrest patients.

**Standardisation of OHCA documentation**

Documentation of OHCAs is often done in a retrospective fashion and does not usually occur at the time that the event occurred. In 2014, it was found that there was a 2-minute absolute imprecision in the timing of critical events during OHCA resuscitation, with an overall magnitude and direction of actual time discrepancies ranging from -18 minutes to 58 minutes. **[**8**]** This regularly results in incomplete documentation of the case details and lack of standardised information. The information is often scattered across multiple electronic documents or flowsheets in the electronic medical records system, or at times, scribbled onto physical sheets of paper. The resultant lack of standardisation and inadvertent missing information not only jeopardises inpatient management but also compromises future endeavours into the improvement of survival rates and advances in the treatment pertaining to OHCA care. **[**9**]**

Such proper and accurate documentation is supported by the task force of the International Liaison Committee on Resuscitation, which recommends the use of a standardised template to assist with accurate and comprehensive documentation, and to augment quality improvement and research reports pertaining to OHCAs. **[**10, 11**]**

At present, it is well known that the outcomes of OHCA and CPR is dependent on early defibrillation, high quality chest compressions, and adequate airway management. Despite the efforts to improve the treatment of cardiac arrest, reported survival figures in Singapore still needs improvement. **[**12**]** If we are to better patient outcomes, then the complete assessment of all potential risk factors and timings of intervention is

key. Such an assessment is continuously held back by the lack of comprehensive data, and the absence of uniformity of records in these cases.

**Challenges in OHCA documentation**

During our data collection, we sought to establish the various reasons behind the issue of documentation by performing a root cause analysis (RCA). This uncovered a multitude of different factors, ranging from the personnel and staff involved, to the environment of the department, and issues with technology and methods used by the staff. This was further compounded by the difficulty that inpatient teams faced in accessing certain information documented by the emergency physicians, taking into account some of the information shared by the prehospital care providers. Figure 1 addresses the results of our RCA.

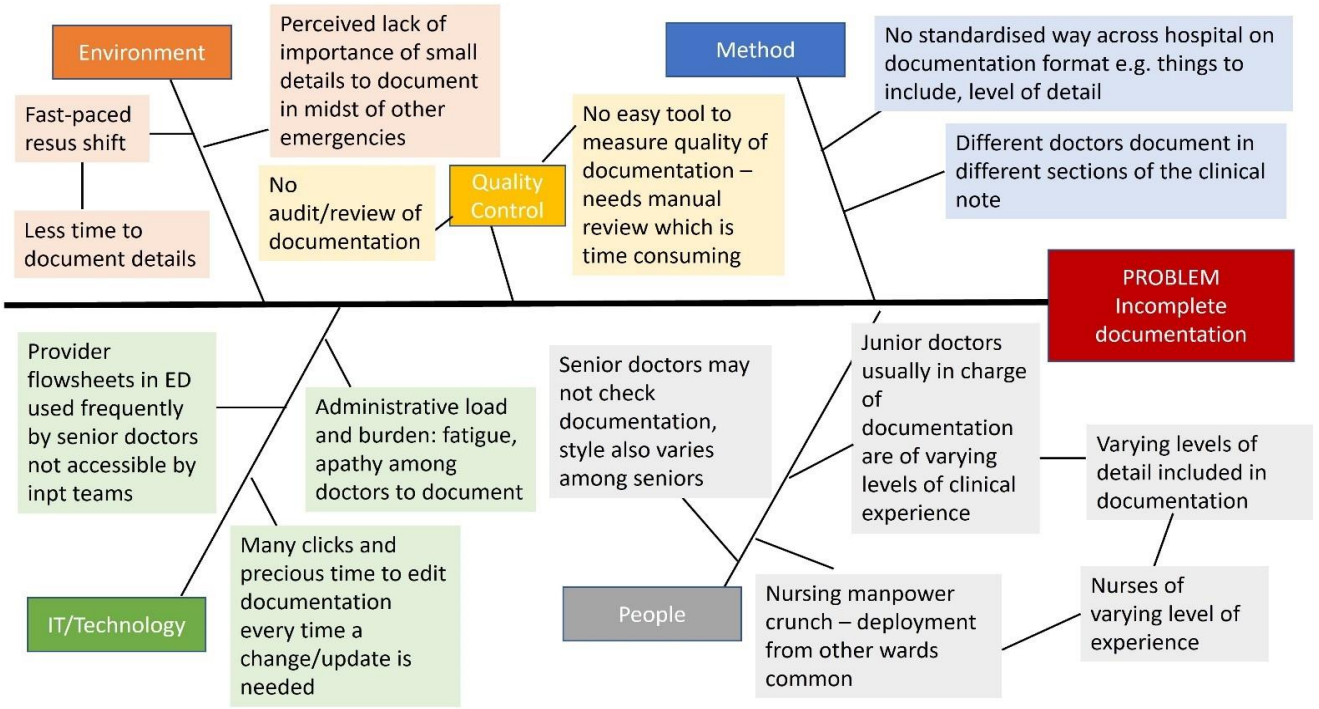


**Fig 1:** Root cause Analysis for Incomplete Documentation in Out of Hospital Cardiac Arrest

To address this, text expansion templates were created to help standardise resuscitation terminology and to include the necessary datapoints required, creating a "guideline" to increase uniformity of the reporting of OHCA. These were implemented within the "Acronym Expansion" function of the SCM (Sunrise Clinical manager, the electronic system used for the ED medical recording) system, functioning both as a documentation template as well as a cognitive aide.

The acronym expansion trial was launched over a period of three months, and initial data collected were from the latter three months of a six-month medical officer posting period. This allowed us to ensure that the junior doctors have had a "run-in" period to familiarise themselves with departmental workflows and electronic system. The template included the various datapoints recommended in internationally standardised guidelines2 and was presented in an easy-to-follow structure, allowing for maximal ease and minimum difficulty in adoption. (Table1). The information to be collected was also shared with the Pan-Asian Resuscitation Outcomes Study (PAROS) coordinator to ensure that it was in keeping with what was being audited and reviewed. **[**13**]** Physicians were provided with a quick introduction on the use of these templates, and compliance was reinforced with the use of visual and written reminders within the Emergency Department.

| |
|---|
| Time found down: |
| Bystander CPR: (yes and details/no) |
| SCDF arrival time: |
| SCDF CPR: (manual/device/started enroute) |
| Initial rhythm: |
| Shocks delivered: (yes and details/no) |
| Rhythm change: (yes/no) |
| Medication given: (yes and details/no) |
| Airway placed: (yes and details/no) |
| Circumstances to CA: |
| |
| In-hospital |
| Rhythm on arrival: |
| Vascular access: |
| Shocks delivered: |
| Medications given: |
| Intubated: (yes+details/no) |
| ETT size and anchor: |
| US findings: |
| Outcome: |
| Post resuscitation: (coroner case/ CCOD/ ROSC) |
| Family communication: |

**Table 1:** The Acronym Expansion Template used in this Study.

## Results

The results of this intervention were presented as mean percentage scores, with normal distribution as assessed by the Shapiro-Wilk test for normality. Minimum and maximum percentage scores were also reported, and the difference between mean scores were performed by an independent T-test.

A total of 96 cases were included in the analysis over 6 months and separated into 3 months pre- and post-intervention periods. There were 51 cases prior to the intervention, and 45 cases post- intervention.

Pre-intervention, the mean completeness score was 57.7% (minimum 20% - maximum 95%). Post-intervention, the mean score was 72.1% (minimum 30% - maximum 100%). The breakdown by individual months is included in figure 2. The difference between mean scores pre- and post-intervention was 14.4% (95% CI 7.25-21.5). (Fig 2)

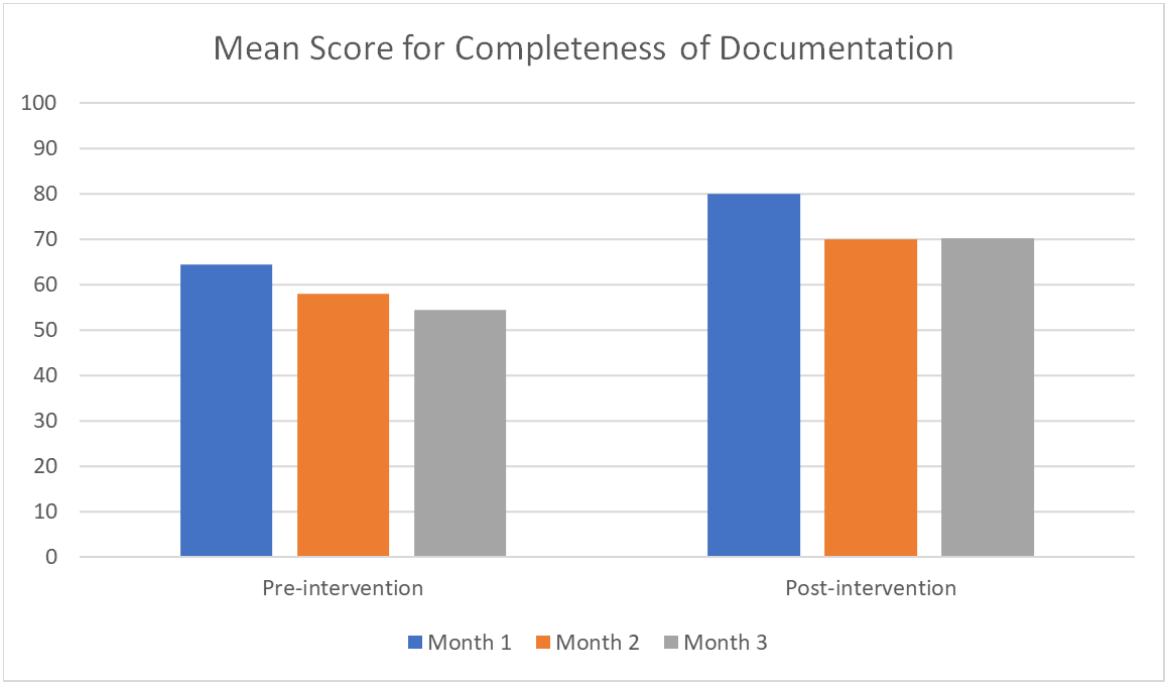


**Figure 2:** Bar chart showing mean scores between pre- and post-intervention of the acronym expansion.

Overall, the uptake of the acronym expansion template was 24.4% (n = 11). In cases where the acronym expansion template was used, the mean score was 91.8% (minimum 75% - maximum 100%). For cases where the acronym expansion template was not used (n = 34), the mean score was 67.5% (minimum 30% - maximum 90%). The difference in means between these two groups was 26.1% (95% CI 16.6-35.5).

## Discussion

The institution of an acronym expansion template showed promise, resulting in the increase in the completeness of documentation from 57.7% to 72.1% pre-to-post intervention. This showed an improvement of 14.4% (95% CI 7.25-21.5). In cases where the acronym expansion template was used, the mean score improved to 91.8%. Interestingly, the percentage of completeness was highest in the first of each of the three-month collection periods, and slowly decreased through the period of assessment. However, with the variance of about 10% in both the pre- and post-intervention groups, it indicates a total of two missed categories out of the twenty that was pre-defined. This could have been indicative of a template drift, where users modify templates or create personal workarounds to adapt to their documentation needs. Another factor might have also been the departure of the principal investigator of this project, who was instrumental in championing the use of the template and reminding colleagues to do so.

The use of a template is not without limitations. Issues discovered during the data collection process revealed that there were elements of an OHCA that remain complicated and difficult to overcome. These include the fact that certain sections of the template are wholly dependent on the reporting of bystanders or the Emergency Medical Services personnel, and on many occasions the information was simply not obtainable. Coupled with the nature of a text-based template where information is deleted or typed, there can be instances where a particular datapoint is overlooked and thus can compromise effectiveness by establishing a “checkbox” mentality. Also, human factors errors can potentially occur as well (even with standardisation in the use of templates).

Template expansions might also not allow for accurate depictions of unique or complex cases and might overlook key details of a case. Evidently, healthcare professionals should use templates as a tool to assist in documentation rather than as a replacement for critical thinking and individualised patient care. Regular reviews and adjustments to these templates, and a good balance between standardisation and flexibility remains the cornerstone of medical documentation. Whilst there are international templates recommendations such as the Utstein template style, which can be adopted by countries and regions, there is also the possibility of local customization to fit the needs of individual population.

## Conclusion

Overall, we have seen that increasing the completeness of cardiac arrest documentation can be improved by the potential use of an acronym expansion template. The promise of clear and standardised documentation also ensures a higher level of clarity and consistency in registries and could potentially spell out advancements in our response toward OHCA. This not only represents a linguistic endeavour, but a strategy to which we can adopt to further improve patient outcomes in the ever-evolving landscape of healthcare.

## References

1. Bakhsh AA, Bakhsh AR, Karamelahi ZA, et al Communicating resuscitation. The importance of documentation in cardiac arrest. Saudi Med J. 2018 Mar;39(3):261-266. doi: 10.15537/smj.2018.3.21885.

2. Allan N, Bell D, Pittard A. Resuscitation of the written word: meeting the standard for cardiac arrest documentation. Clin Med 2011 11(4):348-52. doi: 10.7861/clinmedicine.11-4-348.

3. Nichol G Steen P, Herlitz J et al. International Resuscitation Network Registry: design, rationale and preliminary results. Resuscitation 2005; 65: 265-277.

4. Azdhs.gov. 2022. **[**online**]** Available at: <https://www.azdhs.gov/documents/preparedness/emergency-medical-services-trauma-system/save-hearts-az-registry-education/out-of-hospital-cardiac-arrest-documentation-aid.pdf>

5. Sukul D, Kamphuis LA, Iwashyna TJ et al. Clinical documentation of in-hospital cardiac arrest in a large national health system. Resuscitation. 2017;112: e9–e10. doi: 10.1016/j.resuscitation.2016.12.022.

6. Singapore Medical Council, 2002. Ethical Code and Ethical Guidelines. **[**online**]** Singapore. Available at: <https://www.healthprofessionals.gov.sg/docs/librariesprovider2/guidelines/smc-ethical-code-and-ethical-guidelines-(2002-edition).pdf> **[**Accessed 24 September 2022**]**.

7. Shih CL, Lu TC, Jerng JS et al. A web based Utstein style reporting system of in hospital CPR in Taiwan. Resuscitation 2007; 72: 304-403

8. Adam Frisch, Joshua C. Reynolds, Joseph Condle, Danielle Gruen, Clifton W. Callaway. Documentation discrepancies of time-dependent critical events in out of hospital cardiac arrest, Resuscitation, 2014; 85(8): 111-1114. Available at: https://doi.org/10.1016/j.resuscitation.2014.05.002. (https://www.sciencedirect.com/science/article/pii/S030095721400519X)

9. Yamamoto R, Suzuki M, Hayashida K, Yoshizawa J, Sakurai A, Kitamura N, Tagami T, Nakada TA, Takeda M, Sasaki J; SOS-KANTO 2012 Study Group. Epinephrine during resuscitation of traumatic cardiac arrest and increased mortality: a post hoc analysis of prospective observational study. Scand J Trauma Resus Emerg Med. 2019, 27(1):74. doi: 10.1186/s13049-019-0657-8. PMID: 31420058.

10. Cummins RO, Chamberlain DA, Abramson NS, et al. Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: the Utstein Style. A statement for health professionals from a task force of the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, and the Australian Resuscitation Council. Circulation. 1991; 84: 960–975

11. Milling L, Binderup LG, de Muckadell CS et al. Documentation of ethically relevant information in out of hospital cardac arrest and resuscitation is rare: A Danish nationwide observational study of 16, 495 OHCA. BMC Medical Ethcs 2021; 22: 82. Available at https://doi.org/10.1186/s12910-021-00654-y

12. White AE, Ho AF, Shahidah N et al. An essential review of Singapore's response to out-of-hospital cardiac arrests: improvements over a ten-year period. Singapore Med J. 2021 Aug;62(8):438-443. doi: 10.11622/smedj.2021114. PMID: 35001113; PMCID: PMC8804483.

13. Doctor NE, Ahmad NSB, Pek PP et al. The Pan Asian Resuscitation Outcomes Research Network: what, where, why and how? Singapore Medical Journal, 2017; 58(7): 456-458.