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National Health Information System and Mortality Surveillance in Cameroon: Case of the Yaoundé Emergency Center

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Abstract

Purpose: Improvements in life expectancy are based on population morbidity and mortality data. The initial cause of death is of public health interest. The aim of this study was to describe the causes of death at the Yaoundé Emergency Centre (CURY). **Research problem:** Mortality data in Africa are poorly informed. Policies and programs use reliable data on the health of populations to improve their health. The main question is whether the introduction of medical certification of causes of death (MCCD) initiated a few years ago could improve national death statistics. **Methods:** A retrospective descriptive study was carried out at the CURY from July 2021 to December 2022. This is one of the pilot sites for the implementation of the MCCD in Cameroon. All deaths recorded at the health facility during this period were included. The main data collection tools used were complete death declaration and certification forms and departmental death registries. For analysis, the data were extracted from $DHIS_2$. Ethical considerations were taken into account.

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Results: A total of 967 deaths were recorded during the study period. The monthly average was 54 deaths or 5% of admissions. For analysis, 502/513 (97.05%) deaths were recorded in $DHIS_2$. The mean age was 50.81 years (0-103 years). The sex ratio was 1.36 in favor of males. Four categories of death were identified. Diseases were the main type of death (67.74%). As far as the initial causes are concerned, sepsis is the main disease (13.15%) and poorly formulated causes 19.52%.Death certification needs to be performed properly to provide better information on the health of the population. Data quality remains an important challenge. **Conclusion:** Diseases were the main manner of death. Sepsis was the most important disease in the initial causes. The causes of death to be reformulated represented almost half of the initial causes. Verbal and medical autopsies, as well as improving the quality of the MCCD through the ICD-11, could improve national statistics. **Significance of the research project:** This study which is part of the mortality surveillance system, makes it possible to study the causes of death at CURY.

Keywords: Causes of death; Certification; National statistics.

1. Introduction

Through Data for Health Initiative (D4H), Cameroon has been experimenting with Medical Certification of Causes of Death (MCCD) for three years. Pilot sites were selected in five of the country's regions with the highest mortality rates. Although community-based mortality surveillance is not well developed, hospital facilities are a source of data that feeds into national mortality statistics through District Health Information Software ($DHIS_2$). The initial cause of death is of particular interest for public health because it is the aspect on which policies and programs focus their interventions to improve the health of the population [1]. The main objective of this study was to describe the causes of death at the Yaoundé Emergency Centre (CURY) from July 2021 to December 2022, based on data recorded in $DHIS_2$.

2. Materials and methods

2.1 Type of study and duration

This was a retrospective, descriptive, cross-sectional study conducted from July 2021 to December 2022.

2.2 Study setting

The Yaoundé Emergency Centre is a public referral hospital in the city of Yaoundé that was commissioned in June 2015. It is designed to address medical and surgical emergencies. It has a capacity of 50 beds, which can be expanded to 100 beds in the event of a massive influx of patients. It receives an average of 12,878 patients per year, or an average of 1,073 patients per month [2]. The hospital is composed of 5 admission units, namely the Trauma unit, which receives severe patients as soon as they are admitted. The main care area (APS), is composed of admits patients whose prognosis is not life-threatening and who require a short stay before being transferred to the hospital. The intensive care unit for critical patients and the inpatient unit with isolation rooms. There are also departments for hygiene, sterilization, biology and radiology.

The CURY is one of the pilot sites for the implementation of MCCD in Cameroon. For the study, recruitment was limited to the admitting departments. The data recorded in $DHIS_2$ were analyzed.

2.3 Procedure

Completed death declaration and certification forms and data from department's registers at the time formed the basis of the data. The death declaration and certification forms filled in by doctors in the various departments were sent to the statistics department. The data managers have thus filled in each of the sheets in the system, $DHIS_2$. $DHIS_2$ data were extracted for analysis using Excel.

2.4 Inclusion criteria

All deaths that occurred during the study period were recorded and entered by the statistics department into $DHIS_2$ using the death declaration and certification forms.

2.5 Sampling method

A convenience sampling method was used for recruitment.

2.6 Data collection

Death declaration and certification forms were the main data collection tool. However, general information on deaths in the health facility was obtained from departmental death registries. The variables of interest were age, sex, place of death, type of death, availability of autopsy and cause of death.

2.7 Data quality

The quality of the data was ensured by the use of a validated and standardized tool: death declaration and certification form. In addition, a review of DHIS2 extracts before analysis was conducted.

2.8 Data processing and analysis

The extracted data were integrated into an Excel spreadsheet and then exported and analyzed using IBM SPSS version 22 software.

2.9 Ethical considerations

Ethical considerations were taken into account and the study protocol was submitted to and approved by the Ethics Committee. Informed consent to participate was not obtained from all of the participants. We conducted a retrospective study based on data available at the health facility. Although the study did not directly involve humans, but their data, authorization was obtained from the facility director to access these data and publish the results. Approval was obtained from the director of the CURY prior to the start of the study. Ethical approval was granted under number *CE N° 0723/ CRERSHC/2023* after approval by the *Centre Regional Ethics*

Committee for Human Health Research (CRERSH/C). The anonymity and confidentiality of the data were maintained. The publication of the results is planned at the collection site.

3. Results

3.1 Recruitment

A total of 967 deaths were recorded during the study period, with a monthly average of 54 deaths, 5% of admissions. A total of 513 deaths were recorded in $DHIS_2$, they represented 53.05% of the total deaths.

Of the 513 deaths recorded in $DHIS_2$, 11 were excluded because of significant missing data such as the date of death, cause of death not specified. A total of 502 (97.85%) of the deaths recorded in $DHIS_2$ were analyzed. The mean age of the deceased was 50.81 years (0-103 years). The sex ratio was 1.36 in favor of males.

3.2 Information on deaths

Two categories of deaths were recorded in services registers every month: inpatient deaths and patients who arrived deceased. Patients who arrived deceased represented 43.84% of the total number of deaths recorded in the CURY.

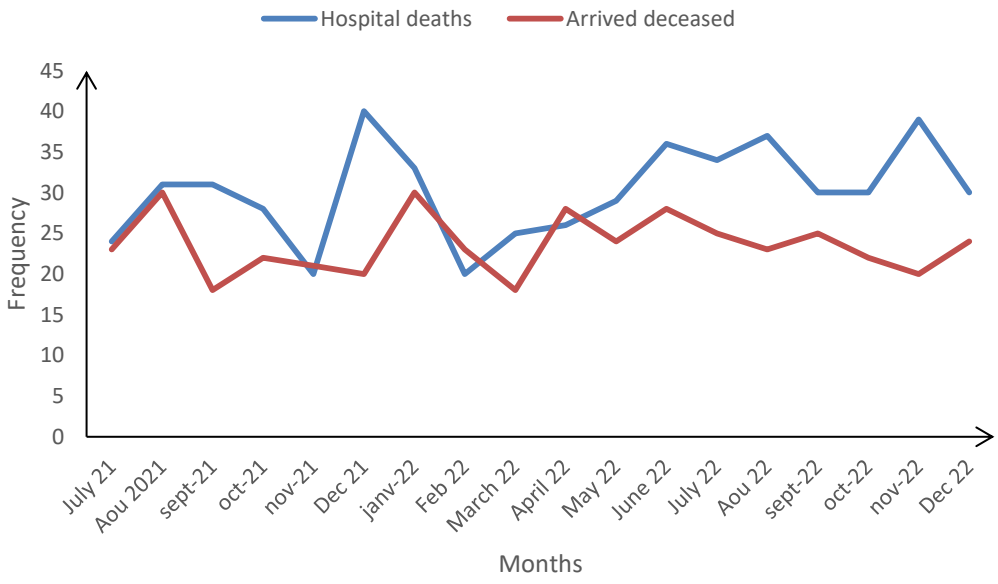

Figure 1: Type of deaths recorded in CURY registers

The main type of death was illness (64.74%) and deaths due to violence represented 12.55%.

Table 1: Type of death

Type of death	Frequency	Percentage (%)
Assault	3	0,6
Accident	60	11.95
Illness	325	64,74
Legal intervention	4	0.8
Unknown	43	8.56
No information	67	13.35
TOTAL	502	100%

No autopsy was performed on the patients, so no usable results for medical certification of the cause of death because they were not available.

Table 2: Autopsies performed

Notion of autopsy performed	Frequency	Percentage (%)
Yes	0	0
No	410	81.67
Unknown	25	4.99
No information	67	13.34
Total	502	100%

According to the place of death, extra hospital deaths recorded in $DHIS_2$ represented 51.6% while the rate of deaths in public road was 3.2%.

Table 3: Distribution of places of death

Place of death	Frequency	Percentage (%)
Home	61	12.15
Hospital	243	48.4
Public road	16	3.18
Unknown	181	36.1
Workplace	1	0.19
Total	502	100%

3.3 Medical Certification of Causes of Death

The certification of causes of death identified 4 categories of causes: 502 initial causes, 192 intermediate causes classified as B, 63 intermediate causes classified as C and 13 immediate causes classified as A. The breakdown identified 13 (2.59%) forms with 4 causes of death, 50 (9.96%) with 3 causes of death, 129 (25.68%) with 2 causes of death and 310 (61.75%) with a single cause of death.

Figure 2 shows the top 10 initial causes of death recorded in $DHIS_2$. There were 66 (13.15%) patients with sepsis and 5.77% with unintentional traumatic injuries.

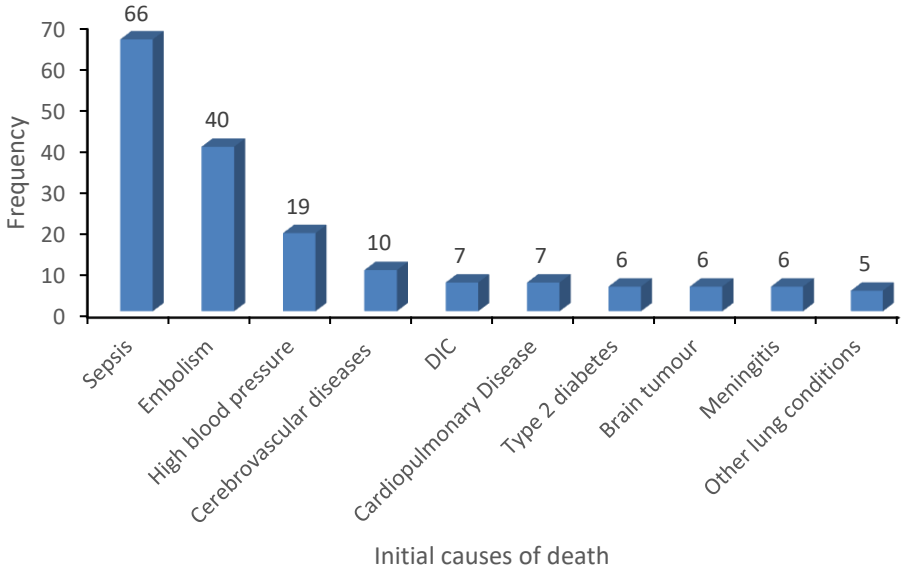

Figure 2: Representation of the top ten initial causes of death

In terms of formulating underlying causes of death, ill-defined causes of death and poorly formulated causes had a rate of 29.08% and 19.52% respectively.

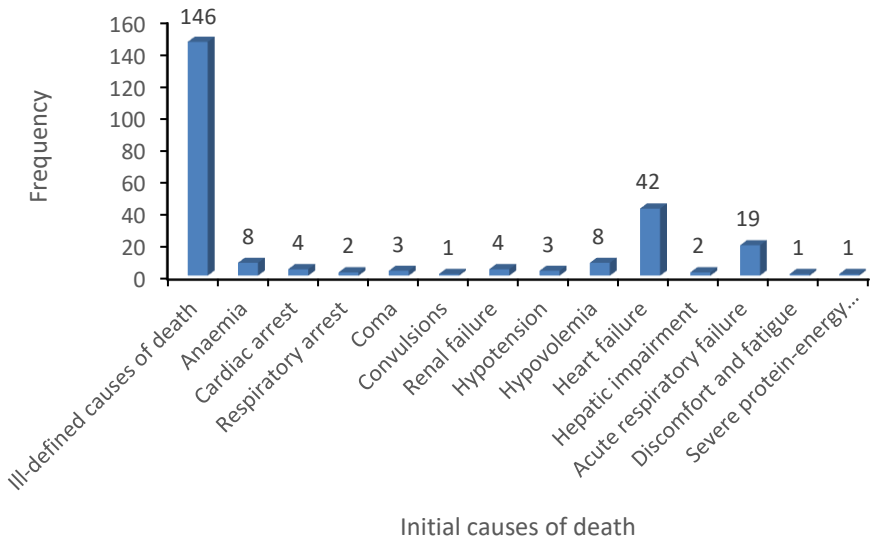

Figure 3: Representation of poorly formulated initial causes of death

4. Discussion

The limitations of our study are mainly related to its retrospective nature. These are especially methodological limitations. The selected files are not necessary representative of the population, hence selection bias. Therefore, the exhaustive analysis was carried out. Future research could consider methods to mitigate bias. Although minimized, we also mention non-responses on the declaration forms. This leaves the results open to interpretation. To this end, we excluded cards with a large number of non-respondents. It was not clear whether this is because the information is absent or simply an omission by the certifier to provide this information or not applicable. Understanding the results may be limited by the lack of contextual data. Managing and analyzing digital files on $DHIS_2$ requires technical skills and specialized human resources, which can be a challenge. To this end, we have involved staff from the national health information unit in this study. However, these limitations do not change the quality of the study.

4.1 Information on deaths

In our series, natural deaths outnumbered violent deaths. These results contrast with those from Dakar in 2019, who reported 70.3% violent deaths compared with 26.5% natural deaths [3]. However, the latter study was based on autopsy results. During this study, no autopsy was performed on the patients. No usable results for medical certification of the cause of death because they were not available although there was a legal intervention initiated for 4 cases (0.8%). A large number of deaths occurred outside the hospital. This rate is consistent with the number of patients who died in hospital. Similar results were obtained in Dakar, where deaths due to prehospital or arrival accidents predominated [3]. Deaths on arrival distort the death statistics at CURY. The proportion of deaths in the community needs to be clarified. In addition, there is a difference between deaths recorded in service records and $DHIS_2$. Extra hospital deaths were 51.6% and 45.84% respectively. This difference can be explained by the fact that each level of registration, there are different stakeholders with an unclear notion of deceased arrivals, some of whom are wrongly attributed to in-hospital or out-of-hospital in the $DHIS_2$. This suggests a need for continuous training to bring staff up to the same level understanding.

4.2 Medical Certification of Causes of Death

In terms of causes of death, although sepsis was the leading cause of death, when the causes were combined, no communicable diseases predominated (17.3%). These results are in line with global statistics for 2019, with 74% of all no communicable diseases [4, 5]. Furthermore, in Senegal in 2010, this predominance of no communicable diseases was observed in a study population almost similar to the majority of our participants (aged 60 and over), although the methodology used was different. [5]. The percentage of accidents, 11.95% was close to the global statistics for 2019, which were 10% [4].

The onset of disease was poorly reported and does not follow certification recommendations [6, 7]. The causes of death included symptoms, organ failure and mode of onset. This raises questions about the quality of the MCCD and the recorded death data. These observations on the quality of morbidity and mortality data were made in Yaoundé in 2023. At the Central hospital, compared with the ICD-11 standards, 41% of the causes of death in this study were inconsistent and 46% were spelling errors, while 83.6% of the staff member claimed to

have sufficient knowledge to complete death certificates [8]. At the Souro Sano University hospital in Bobo Dioulasso, the audit we carried out on the quality of the medical file showed that the median quality was poor (38%) [9]. This problem is mainly related to the fact that the guidelines for health registration do not take into consideration the realities and diversity of Africa [9]. Studies to assess the quality of certification have been conducted, especially in Europe. Even if the latter are rare in our African context [10]. Some authors propose audits to improve the quality of mortality data [11, 12]. However, no studies have shown an impact of reviews mortality on quality and the safety of care [13]. Nguefack and his colleagues suggested that a standard tool should be used to assess morbidity and mortality [8]. However, in the present study, the use of the death declaration form, a standardized tool validated by the country for the MCCD, was still low.

5. Conclusion

The number of extra hospital deaths leading to CURY is significant. No autopsy was performed during the study. Natural deaths were most common in CURY, especially the group of non-communicable diseases. As far as the initial causes are concerned, sepsis is the main disease. To improve the mortality statistics, verbal autopsies need to be carried out in our context to determine the causes of death, and extra hospital deaths call for improvements in prehospital care. For MCCD, the target groups should be made more familiar with the ICD-11, and it is recommended that autopsies be popularized for suspicious deaths to refine the determination of the cause of death.

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