



# Audit of Mortality in a University Surgical Unit in a Low-Income Country

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## Abstract

**Objectives:** To identify leading and preventable causes of death in a surgical unit of a tertiary care hospital in a low income country.

**Material and Method:** This was a retrospective study covering a period of two years (January 01<sup>st</sup>, 2018 to December 31<sup>st</sup>, 2019). Patients who died during hospitalization in the visceral and general surgery department of the Sylvanus Olympio University Hospital in Lomé (Togo) were included.

**Results:** 53 were included, with a mortality rate of 1.92%. The mean age was 51.7 years  $\pm$  15.3 (range: 20 to 80 years). Of the patients, 26 were male (sex ratio: 0.96). One or more comorbidities were observed in 21 patients. Of the included patients, 31 who had not undergone surgery died (56.6%). Among these patients, 30 (96.7%) were diagnosed with terminal stage cancer. Death was noted as a post-operative outcome in 22 patients (41.5%). Operations were performed in an emergency context in 18 cases (81.81%). Septic shock was the cause of death in 12 patients (54.4%). The leading factor contributing the death of the surgical patients was ineffective treatment in 18 patients (33.96%). Pre-operative physiological status and treatment delay were involved in respectively 11 (20.75) and 10 cases (18.87).

**Conclusion:** Preventable mortality in this study was essentially limited to surgical patients, and half the patients who died received palliative care. Early management of patients and better treatment decisions should improve the outcome of care and reduce mortality.

**Keywords:** Mortality; Surgery; Low income; Audit; Complications

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## Introduction

Hospital mortality is one of the most significant measures of quality of care [1]. In low-income countries such as Togo, numerous problems, including insufficient technical and human resources, threaten quality of care. These challenges become more pronounced in surgical settings due to the complexity of surgical treatments, the intrinsic morbidity of conditions requiring surgery, and anesthetic risks, resulting in high mortality rates [2]. The results of a large international multicenter study published in 2018 showed that the risk of post-surgical mortality was twice as high in Africa as compared to that in high income countries [3]. These results expose the problems with access to quality surgical care in resource-limited countries; however, it is difficult to generalize this data as the study did not account for all deaths. It is, therefore, necessary to elucidate the determinants of hospital mortality both periodically and contextually [4]. Primarily, the organizational problems and practices that cause avoidable morbidity and mortality must be identified. General surgery departments receive patients who are at risk due to abdominal emergencies or tumor-related diseases; however, no study in Togo has assessed the role of both these conditions as well as the organization of care in hospital mortality to date. The general objective of the current study was to provide useful data for improving professional practices in the context of a low-resource country. More specifically, the present study aimed to describe the circumstances of death and determine the elements that may have contributed to death in such a context.

## Material and Method

This was a retrospective study covering a period of two years (January 01<sup>st</sup>, 2018 to December 31<sup>st</sup>, 2019). Patients who died during hospitalization in the visceral and general surgery department

of the Sylvanus Olympio University Hospital in Lomé (Togo) were included. Patients with incomplete medical records were excluded. The variables examined were age, sex, diagnosis, complications, and the circumstances and causes of death. Qualitative variables were expressed as frequency, while quantitative variables were expressed as mean, extremes, and standard deviation. Patient records were reviewed by a team of three surgeons who then selected a primary cause of death. The audit of death consisted of determining the role of treatment delay, treatment methods, surgical complications, comorbidities, and pre-operative physiological state in the cause of death.

## Results

Out of 2,755 patients admitted during the study 53 were included in the present study, with a mortality rate of 1.92%. The mean age of the patients was 51.7 years  $\pm$  15.3 (extremes of 20 and 80 years). Of the patients, 26 were male (sex ratio: 0.96). One or more comorbidities were observed in 21 patients; hypertension was observed in 17 patients, diabetes in six, HIV in four, and asthma in three.

Of the included patients, 31 who had not undergone surgery died (56.6%). Among these patients, 30 (96.7%) were diagnosed with cancer; all had TNM stage 4 cancer (Table 1). Death occurred within an average of 30.6 days; the cause of death in non-operated patients was terminal cancer in 30 patients and septic shock in one patient with a pulmonary contusion complicated by sepsis.

Death was noted as a post-operative outcome in 22 patients (41.5%). Operations were performed in an emergency context in 18 cases (81.81 %). Intestinal resection followed by anastomosis was performed in nine patients (Table 2). Of the 22 patients who underwent surgery, 17 (77.27%) presented with one or more complications (Table 3). Reoperation was performed in four patients (18.1%). Among the surgical patients, death occurred within a mean time of 5.2 days (range: 1 to 45 days). Septic shock was the cause of death in 12 patients (54.4%). The factors contributing the death of the surgical patients are reported in Table 4. Ineffective treatment was reported in 18 patients (33.96%). Of those patients, 12 received inadequate antibiotic therapy and nine had anastomosis in purulent peritonitis. A lack of thromboembolic prophylaxis administration was noted in one patient.

## Discussion

The mortality rate that was observed in this study (less than 10%) was comparable to that reported previously [1,2,5-7]. Anelechi et al. [8] reported a mortality rate of 9% in a comparable context. Although the mortality rate observed in the present study was low, caution must be taken when extrapolating this rate [9] and several elements, such as the profile of the patients and the circumstances of death must be considered in an objective analysis [10].

The possible causes of death in the surgical environment are numerous and not always linked to surgical intervention [5,7]. Non-surgical-related death represented half of the cases identified in this study as well as in that of Onyemachi et al. [2]; the context of care in that study is comparable to that examined here. In another study, 71% of patients who died had not undergone surgery [1]. The proportion of non-surgery related deaths varies depending on the etiology of death, which can be summarized as either neoplasia, infection, or trauma; these three groups represented more than 80% of the causes of death in the present study, as well as in several other studies [2,4-6].

**Table 1:** Patients' diseases in non-surgery-related deaths.

	Number	Proportion (%)
Cancer	30	56.6
Pancreas	9	29.03
Stomach	6	19.36
Rectum	5	16.13
Oesophagus	5	16.13
Liver	2	6.45
Biliary tract	2	6.45
Ovary	1	3.23
Trauma	1	3.23

**Table 2:** Surgical procedures associated with mortality.

	Number	Proportion (%)
Intestinal resection and anastomosis	9	40.9
Appendectomy	3	13.64
Colostomy	3	13.64
Kelotomy	2	9.09
Gastrostomy	2	9.09
Cholecystectomy	1	4.55
Biliodigestive shunt	1	4.55
Peptic perforation repair	1	4.55

**Table 3:** Post-operative complications in deceased patients.

	Number	Proportion (%)
Post-operative peritonitis	9	40.9
Unexplained sepsis	3	13.64
Pneumonia	2	9.09
Gastrointestinal hemorrhage	2	9.09
Pulmonary embolism	1	4.55
Evisceration	1	4.55
Post-operative ileus	1	4.55

**Table 4:** Factors contributing to post-operative death.

	Number	Proportion (%)
Ineffective treatment	18	33.96
Post-operative complications	12	22.64
Pre-operative physiological status	11	20.75
Treatment delay	10	18.87
Comorbidity	2	3.77

The study of the distribution of causes of death provides important indications of public health [11]; however, it does not provide precise indications for the improvement of professional practices. These indications can only be provided by an audit, whose role in reducing mortality has been proven [12,13]. The effectiveness of an audit relies largely on the quality of the data contained in the medical file, aspects of which are lacking in the context of the present study. This is illustrated by the absence of data that could explain the cause of death in 11.32% of the patients examined in this study. In the absence of an exhaustive audit, this study targeted management aspects that could be easily identified and improved by reading medical records. This objective study of mortality requires the definition of avoidable

mortality, despite there being no consensus on this definition. It was simpler to define non-preventable deaths, as described by Seymour et al. [14] compared to those of patients with terminal cancer and inoperable patients. Half the patients examined in the current study who died met this definition. In the remaining patients, the important role of surgical complications was revealed, including that of post-operative peritonitis, which was mainly caused by anastomotic leakage. Occurrence of these complications has been proven to be influenced by several factors, including ASA score, comorbidities, shock, and local inflammation [15]. These factors were combined in the patients who underwent surgery, as the majority was in a life-threatening emergency. Considering these elements, this analysis determined that the decision of anastomosis was inappropriate in 16.98% of the patients. The benefits in delayed anastomosis must be considered, despite the difficulties of stoma care in developing countries [16].

Treatment delays play a determining role in the prognosis of abdominal emergencies, and these delays were found to have contributed to mortality in 18.87% of the patients. This problem concerned 4% of patients in the study by Semmen et al. [17]. Both these results indicate that there is considerable room for improvement in patient management. Treatment delays are commonly a matter of concern in middle- and low-income countries [18]. In a study by Kumar et al. [6], 68% of patients were managed after five days of progression. Barriers to timely delivery of surgical care include access to medical insurance, health education, and care pathways, which are beyond the influence of professional practices and, therefore, need to be addressed as public health matters.

This study did not find an important role of comorbidities in patient death, contrary to the results of a study by Semmen et al. [17], in which comorbidities were found to be important in 91% of patients. The average age of nearly 80 in this previous study explains this difference, as the patients examined in the present study were relatively young. Despite this, inadequacies in the pre-operative workups conducted during the present study may have caused conditions that could affect prognosis to be overlooked.

## Conclusion

Preventable mortality in this study was essentially limited to surgical patients, and half the patients who died received palliative care. Early management of patients and better treatment decisions should improve the outcome of care and reduce mortality.

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