

## Mortality in Surgical Resuscitation at Chu-Kara

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**Keywords:** *Surgical; Mortality*

### Abstract

**Title:** Mortality in the surgical intensive care unit of the CHU-Kara.

**Aim:** To make an inventory of the mortality in the surgical resuscitation of the CHU-Kara.

**Introduction:** Hospital mortality, a real public health problem, remains a real concern in the ICU and especially in the surgical ICU because of several risk factors.

**Methodology:** This was a retrospective study of the records of patients who died in the surgical intensive care unit of CHU-Kara over 12 months from November 1, 2019 to October 31, 2020.

**Results:** 70 deaths were retained for the study. The mean age was  $48.70 \pm 20.65$  years with the extremes two days of life (D2) and 80 years. Male gender predominated. Non-traumatic pathologies (69.5%) dominated, including acute generalized peritonitis (24.4%). Traumatic pathologies (30.5%) were associated with TCE and polytrauma (33.3% each). Clinically, 20% were in shock, 25.7% had respiratory distress and 38.6% had altered consciousness with an average admission time of 17.5 hours. Deaths occurred in 61.4% of cases within 24 hours after admission to the intensive care unit. 50% of deaths occurred between 8pm and 8am in the context of infection (44.3%), cardiac failure (34.3%), respiratory failure (20%) and neurological failure (5.7%). 15.6% of deaths occurred in the month of January. All patients received vascular filling, 65.2% received antibiotic therapy, 31.8% received transfusion and 15.2% received analgesics. The average length of hospital stay was 4.6 days. The mortality rate was 7.8%.

**Conclusion:** Mortality in the surgical intensive care unit of CHU-Kara remains very high. It affects young patients, for essentially traumatic and infectious surgical pathologies. The improvement of the management of these patients requires adequate equipment of the service and continuous training of the staff.

## Introduction

Mortality is a demographic phenomenon of great concern in developing countries, especially in sub-Saharan Africa. The interest in the analysis of this phenomenon takes into account the fact that, as a component of the population dynamics, mortality also remains an indicator of the social development of a country. It allows not only the evaluation of health programs but also the social, economic and natural environment that give an idea of the living conditions of the population [1].

Death is a major event that constitutes an element whose evaluation and analysis are necessary in a resuscitation service [2].

In France, the mortality rate of patients admitted to the intensive care unit was 18% in 2007 [3]. In India, the mortality rate was estimated at 30.6% in 2005 [4].

In Africa, in Morocco, the ICU mortality rate was 33.4% in 2017 [5]; in Mali, 41.46% in 2006 [6]; in Togo 32.38% in 2014 [7].

In order to reduce mortality in the surgical intensive care unit since the arrival of the anesthesiologist, it was essential to conduct a study on mortality in the intensive care unit with the general objective of taking stock of mortality in the surgical intensive care unit of CHU-Kara

## Methodology

Our study took place in the surgical resuscitation department of the University Hospital of Kara (CHU-Kara), a national reference center in the northern part of Togo.

## Infrastructure and Equipment

The resuscitation department occupies the first floor of a multi-storey building. It is composed of a room facing the operating room. It is occupied by eight (8) beds, equipped with two multiparametric monitors, one of which is functional, a functional respirator, an electric syringe pump, a saturometer, emergency drugs and a laryngoscope.

## Staff

The medical care was ensured by: a resuscitating doctor in charge of the service; three paramedics including a supervisor of the service; four nurses; four nurses on duty.

## Organization of the Work

A team composed of a nurse, a paramedical anaesthetist and a nurse on duty ensured every day including weekends and holidays.

## Study Methods

This was a 12-month retrospective study from November 1, 2019 to October 31, 2020.

Patients who died in the surgical resuscitation department during the period from November 1, 2019 to October 31, 2020 were included.

All records of patients who died during the study period were included in the study.

Records of patients who died before admission to the ICU were excluded from the study.

We used medical records, therapeutic and monitoring charts, anesthesia records, operative report registers, and surgical resuscitation registers.

We collected data from medical records, anesthesia records, therapeutic charts, operative report registers, and the interrogation of the department supervisor.

The parameters studied were:

sociodemographic and epidemiologic aspects; date and time of admission;

time of admission; initial diagnosis; vital function status on admission:

(respiratory impairment; hemodynamic impairment; neurological impairment); pathological history; pathologies; treatment performed in surgical resuscitation; complications; causes of death; length of stay in resuscitation.

Data processing was done manually, and data entry was done using Excel 2016 software. Statistical analysis of the data was performed using EPI data 3.1 and Microsoft Excel 2016 software.

The quantitative variables were described in numbers and percentages; and were compared using the chi-square or Fisher tests, with a p-value of less than 0.05 as the threshold of significance.

### **Ethical Aspects**

For the realization of the study, a written request had received a favorable opinion of the director of the CHU allowing the investigation on October 07, 2020.

## **Results**

### **Sociodemographic Aspects**

#### *Number of Deaths*

During the study period, 70 deaths were recorded out of 900 patients admitted, i.e. 7.8% deaths.

#### *Age*

The mean age was  $48.70 \pm 20.65$  with extremes of D2 and 80 years.

#### *Sex*

There were 49 (70%) male and 21 (30%) female deaths with a sex ratio of 2.33.

#### *Origin of the Deceased Patients*

Emergency 52 cases (74.3%); surgery 15 cases (21.4%); gynecology and obstetrics 3 cases (4.3%).

#### *Admission Time*

The average admission time was 17.5 hours. 62 cases (88.6%) had a delay of less than 24 hours,

### *Pathological Aspects*

Initial pathologies:

Surgical pathologies 59 cases (84.3%); medical pathologies 5cas (7.1%);

Obstetrical pathology 3 cases (4%); not known 3 cases (4.3%).

Forty-eight (48) patients (68.6%) had urgent pathologies.

Medical pathology

Envenomation 2 cases; erysipelas of the leg 2 cases; metabolic disorder 1 case.

Surgical pathologies

Envenomation 2 cases; erysipelas of the leg 2 cases; metabolic disorder 1 case.

Forty-one (41) patients (69.5%) had non-traumatic pathologies and 18 (30.5%) had traumatic pathologies.

o Traumatic surgical pathologies

Cranioencephalic trauma 6 cases (33.3%); polytrauma 6 cases (33.3%)

Abdominal contusion 3 cases (16.7%); spinal cord compression 1 case (5.5%);

severe thermal burn 2 cases (11.1%).

Non-traumatic surgical pathologies

**Table 1:** *Distribution of deaths by non-traumatic surgical pathology*

	Number	Percentage
Acute generalized peritonitis	10	24.4
Superinfected wound	5	12.2
Wet gangrene of the foot	5	12.2
Intestinal occlusion	3	7.3
Maxillary cellulitis	3	7.3
Strangulated inguinal hernia	2	4.9
Colon tumor	2	4.9
Acute appendicitis	2	4.9
Benign prostatic hyperplasia	2	4.9
Myositis	1	2.4
Strangulated umbilical hernia	1	2.4
Leg ulcer	1	2.4
Phlegmon of the hand	1	2.4
Necrotizing fasciitis	1	2.4
Hirschprung’s disease	1	2.4
Odontitis	1	2.4
TOTAL	41	100

Obstetrical pathologies

Ectopic pregnancy 1 case; eclampsia 1 case; postabortal hematuria 1 case.

### **Vital Distress**

#### **Alteration of Consciousness**

Severe coma 16 cases (22.9%); moderate coma 5 cases (7.1%); mild coma 6cas (8.6%);

Normal consciousness 37 cases (52.9%); Unknown 6 cases (8%).

Altered consciousness concerned 27 patients (38.6%).

#### **Respiratory Impairment**

Eighteen (18) patients (25.7%) had respiratory distress.

#### **Hemodynamic Impairment**

Fourteen (14) patients (20%) had hemodynamic shock.

#### **Associated Medical Pathologies**

HTA 8 cases (11.4%); diabetes 4 cases (5.7%); peptic ulcer 3 cases (4.3%);

asthma 1 case (1.4%); stroke 1 case (1.4%); HIV 1 case (1.4%).

One patient had one or more associated pathologies.

### **Treatments**

#### **Medical Treatment**

Sixty-six (66) patients (94.3%) had medical treatment and 4 patients (5.7%) had medical treatment after surgery.

Medical treatment without surgery

**Table 2:** *Distribution of patients according to medical treatment received.*

	Number	Percentage
Vascular filling	66	100
Antibiotic therapy	43	65,2
Transfusion	21	31,8
Analgesic	10	15,2
Corticosteroids	9	13.6
Vasoactive amines	8	12.1
Sedation	8	12,1
Anti-malarial	6	9,1
Antihypertensive	6	9,1
Gastric bandage	5	7,6
Anticoagulant	4	6,1
Insulin therapy	3	4,5
Antispasmodic	3	4,5
Polyvalent antivenom serum	2	3
Bronchodilator	1	1,5

One patient had one or more treatments.

### **Postoperative Medical Treatment**

Vascular filling 4 cases (all); antibiotic therapy 4 cases (all); analgesic 4 cases (100%); hemostatic 3 cases (75%); vasoactive amines 1 case (25%); sedation 1 case (25%); transfusion 1 case (25%).

One patient had one or more treatments.

### **Surgical Treatment**

Digestive surgery 2 cases; Neurosurgery 1 case; Maxillofacial surgery 1 case.

### **Oxygen Therapy**

Oxygenation was done with a face mask in 25 patients (35.7%) and with a tracheal tube in 7 patients (10%).

### **Treated Evolution**

#### **Complications**

Thirty (30) patients (42.9%) had complications.

Cardiocirculatory 24 cases (80%); infectious 15 cases (50%); respiratory 11 cases (36.7%); metabolic 6 cases (20%); neurological 3 cases (10%); renal 1 case (3.3%).

One patient had one or more complications.

### **Time of Death**

02 to 08h: 13 cases (18.6%); 8 to 14h: 11 cases (15.7%); 14 to 20h: 20 cases (28.6%);

20 to 02h: 22 cases (31.4%); 4 cases (5.7%) not known.

### **Causes of Death**

- Risk factors for death.

Infectious 31 cases (44.3%); cardiovascular 24 cases (34.3%); respiratory 14 cases (20%)

Neurological 4 cases (5.7%); renal 3 cases (4.3%); metabolic 2 cases (2.9%); toxic, digestive and refusal of care 1 case each; not known 24 cases (34.3%)

One patient had one or more risk factors.

### **Length of Hospitalization**

The average length of hospitalization was 4.6 days with extremes of 0 and 64 days.

Nearly 43 cases (61.4%) had a length of stay of 0 to 2 days.

### **Discussion**

Our discussion focused on:

✓ Sociodemographic and epidemiological aspects;

✓ Pathological aspects;

Initial diagnosis

Status of vital functions on admission

Pathological history



## Pathologies

✓ Treatments carried out in surgical resuscitation;

✓ Evolution treated;

## Complications

## Causes of death

Length of stay in the intensive care unit.

## Sociodemographic Aspects

### Number of Patients

Our study included 70 deaths (7.8%) during a 12-month period in the surgical intensive care unit of the CHU-Kara. This death rate is largely due to traumatic pathologies and non-traumatic emergencies. This low number would be related to less complex pathologies that surgeons were not yet used to. This period corresponded to the new arrival of the intensive care anesthetist. This rate is almost identical to that of Mbengono JAM, Bengono RB, Nkodo JM, Essame TC, Amengle AL, Minkande JZ [8] in Cameroon with 7.8%. Higher rates were found among Egbohou P, Mouzou T, Tomta K, Sama H, Assénouwè S [7] in Togo, Sougane M. [6] in Mali and Koukous A. [9] in Morocco with respectively 32.38%, 41.46% and 25.8%. Our rate is low compared to those of developing countries because of the high number of women who underwent caesarean section with fewer deaths and less complex pathologies.

### Age

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### Sex

The sex ratio was 2.33. The male predominance reflects the higher exposure to the risk of death probably related to trauma because men would be more active in reckless driving of machinery and in occupations

with traumatic potential such as motorcycle drivers for the most part. Our ratio is similar to that of Egbohou P [7] with 2.2. Lamine N [13] in Mali found a lower sex ratio than ours, respectively 1.6 and 1.94. Zhu Z. Shang X. Peiyi Qi<sup>1</sup> and Shengli Ma [14] in China found a high value 3.23. In most studies, men are more exposed to death.

### **Origin of Patients Who Died**

Seventy-four point three percent (74.3%) of patients came from the emergency department. The emergency department is a landmark of patient entry to the hospital. Our rate is higher than that of Moulay EK. [15] in Morocco with 57.62%. But ours is lower than Lamine N and Maiga O [13, 16] with respectively 81% and 78.59%. The lack of emergency gestures in the emergency department are factors favoring a high mortality. In our context, it was simply a reception and orientation service, nothing more.

### **Admission Time**

The average admission time was 17.5 hours. It is thought to be related to referral difficulties and insufficient financial means of the parents. The majority of patients who died (88.6%) were admitted within the first 24 hours. There were also a few hours between the emergency department and the intensive care unit for the preparation of a medical record. The work of Al-Maimouni AY [10] in Morocco reported 53% of admissions within the first 24 hours. The seriousness of the accidents and pathologies of the patients in our context directed their admission in surgical resuscitation to less than 24 hours, especially since it was simply a reception and orientation service. In our context, there was no EMS.

The longer the delay, the more the patients are exposed to the risk of aggravation and therefore morbidity and mortality.

### **Pathological Aspects**

#### **Initial Pathologies**

Deaths related to surgical pathologies were higher (84.3%). The surgical resuscitation unit of the CHU-Kara was not a polyvalent resuscitation unit. It received mainly surgical pathologies.

Our rate was higher than that of Egbohou P [7] in Togo with 76.37%. The difference observed would be related to the performance of his study in the polyvalent surgical resuscitation.

#### **Medical Pathologies**

Envenomation and leg erysipelas were the two dominant medical pathologies. Their complications led to their management in surgery and thus in surgical resuscitation. Sougane M [6] and Maiga O [16] in Mali and Konan KJ, Babo CJ, Ayé YD, Bouh K J, Kouamé YS, Soro L *et al* [17] in Côte d'Ivoire reported a predominance of cerebrovascular accidents (CVA) with respectively 57.14%, 23.28% and 26.30% in the multipurpose intensive care units. Stroke is a rare pathology in non-multipurpose surgical intensive care units, yet its management is a public health problem.

## **Surgical Pathologies**

Non-traumatic surgical pathologies dominated (69.5%) followed by traumatic pathologies (30.5%). Infectious surgical pathologies dominated non-traumatic surgical pathologies and explained their high rate. Moulay EK [15] in Morocco found a low percentage of both surgical pathologies with respectively 24.71% and 16.85%. Other authors reported a predominance of traumatic surgical pathologies such as Al-Maimouni AY and Egbohou P. [10, 7] with respectively 14.9% and 31.22% of non-traumatic pathologies then 29.6% and 45.15% of traumatic pathologies. For the latter, the high frequency of public road accidents would explain this high rate of traumatic pathologies. Their etiologies should be investigated in order to prevent them.

## **Traumatic Surgical Pathologies**

Traumatic pathologies were dominated by severe head trauma (TCE) and polytrauma (33.3% each). The inadequacy of the technical platform and the seriousness of these pathologies associated with the delay of first aid would explain their high mortality. According to Al-Maimouni [10], TCE accounted for 80%. In our context, the rate is close to that of Egbohou P [7] with 34.18% for severe TCE.

TCE and polytrauma are serious pathologies and their high mortality rates constitute a public health problem in our context. Preventive measures should be associated to reduce their number, severity and mortality.

## **Non-traumatic Surgical Pathologies**

They were dominated by peritonitis (24.4%). Their mortality would be linked to the diagnostic and therapeutic delay, to the insufficient financial resources of the parents and to the insufficiency of the technical platform of the surgical resuscitation.

Our results are superior to those of Egbohou P [7] with 8% of generalized peritonitis.

It would be necessary to educate for health, to solicit the Togolese State to make universal health insurance effective for the entire population.

## **Vital Distress**

Altered consciousness was the most represented vital distress (38.6%). This is probably related to severe CTE, polytrauma and generalized peritonitis with septic shock.

Our results are similar to those of Lamine N [13] with 38.77%.

Mbengono, Maiga O and Sougane M [8, 16, 6] had higher figures with respectively 51.3%, 54% and 76.96%.

Altered consciousness is a risk factor for mortality. The more it is associated with other pathologies, the more it increases mortality by its gravity.

Respiratory impairment (25.7%), this rate was almost similar to that of Egbohohou P [7] in Togo with 21.9%. Like altered consciousness, respiratory damage increases mortality by hypoxia or tissue anoxia.

Hemodynamic shock (20%) in peritonitis and polytrauma was certainly a risk factor for mortality due to decreased perfusion and tissue oxygenation.

### **Associated Medical Conditions**

The majority of patients had hypertension (11.4%) followed by diabetes (5.7%). They were factors favoring the risk of mortality by decompensation. Our results are lower than those of EL-Fassi A and Al-Maimouni AY [18, 10] with respectively 33.7% and 19.9% for hypertension and 24% and 14.5% for diabetes.

The difference in these figures is due to the high frequency of these associated pathologies in these populations (pathologies of well-off people).

### **Treatments Received**

Antibiotic therapy represented 65.2% of the treatment received due to the infectious surgical pathologies in our context. Our result is superior to that of Moulay EK. [15] with 61.23%. Infection is a factor of aggravation of mortality leading to severe sepsis.

Vascular filling for all surgical resuscitation patients was the rule.

Blood transfusion was performed in the case of hemorrhagic shock (31.8%) caused by polytrauma and peritonitis. This rate is lower than that of Moulay EK [15] with 48.87%. This low rate of transfusion was related to the unavailability of blood products which was also a risk factor for mortality in our context.

Oxygen therapy in the context of respiratory distress and hemorrhagic shock was done with a face mask (35.7%) and tracheal intubation (10%). This rate is lower than those of Al-Maimouni AY and Moulay EK [10, 15] with respectively 42.1% and 92.70%. Oxygenation had allowed the avoidance of hypoxia and anoxia which favored the reduction of morbidity and death.

### **Evolution**

#### **Complications**

Complications accounted for 42.9%. They were dominated by cardiovascular complications, followed by infectious and respiratory complications. Peritonitis and polytrauma would probably be at the origin of cardiovascular complications, which are additional factors for the high mortality. On the contrary Al-Maimouni AY and Moulay EK. [10, 15] found nosocomial infections predominant with respectively 10% and 37.64%.

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In our context, infectious complications would be related to peritonitis, polytrauma and even nosocomial infections. Respiratory complications were also important and related to peritonitis, polytrauma and severe TCE.

All these complications were the bed for the mortality of these patients. Preventive measures against infections in the intensive care unit should be associated.

### **Time of Death**

There were more deaths between 8pm and 2am followed by 2pm and 8pm then 2am and 8am. There were more deaths at times when paramedics were alone and especially at night (50%).

The absence of MARs during these hours explains in large part this higher mortality.

Also, the lack of staff on duty was an important factor in the number of deaths, with one nurse per 8 beds. This was similar to the conditions of Egboh P and Moulay E.K [7, 15] with respectively 51.9% of deaths between 5pm and 7am and 48.31% between 9pm and 7am. This rate was lower in Takongmo S [19] with 58.6% of deaths between 17 hours and 7 hours. This is explained by the overload of the on-call team for night care administration. This increase in deaths began during the period 14:00–20:00 where the nurse was alone without the resuscitating physician.

### **Cause of Death**

In our context, infections were the main causes of death (44.3%) followed by cardiovascular causes (34.3%). They were related to peritonitis and polytrauma. Our results were superior to those of Koukous A and Moulay E.K [9, 15] with respectively 39.2% and 33.7% of infectious causes then 6.15% and 9.55% of cardiovascular causes. The high value of these causes contributed to the high mortality rate. It is necessary to take preventive measures against infections in intensive care.

### **Duration of Hospitalization**

The average length of hospitalization was 4.6 days with extremes of 0 and 64 days. The highest death rate was between 0 and 2 days (61.4%). The inadequacy of the technical platform is a risk factor for mortality, as well as the delay in diagnosis and treatment, the long delay in admission, the insufficient financial resources of the patient's relatives, and the complexity and severity of the pathologies were all factors that contributed to early death after admission to the surgical intensive care unit. Our results were superior to those of Sougane M [6] with 1.40 days and similar to those of MAIGA O and Ouédraogo N [16, 20] with

respectively 4.60 and 4.69 days. Our mean duration of hospitalization is lower than those of Koukous A and Moulay E.K [9, 15] with 11.69 and 10 days respectively, as well as those of Rosenberg A and Rocker G [21, 22] with 11.8 and 9 days respectively. This difference is due to the difference in the patients recruited and also to the speed of patient management and the availability and quality of the technical facilities.

## Conclusion

This was a 12-month retrospective study of the records of patients who died during this period.

The mortality rate in surgical resuscitation was 7.8%.

Young people and young adults were more affected. The male gender was more represented. Most of the patients passed through the emergency department, which is a reception and referral service. The admission time was long due to the lack of a permanent emergency service. The initial pathologies were mostly surgical. The latter were non-traumatic, followed by traumatic pathologies (severe head trauma and polytraumatic), all of which were associated with vital distress.

The patients before their death had benefited from medical and surgical treatment. The medical treatment had dominated the management. It was centered on the care of the resuscitation.

The evolution under treatment was marked by complications among which infections. The hours of death were in the afternoon and at night marked by the absence of MAR and the insufficiency of the paramedical staff.

The causes of death were dominated by infectious and cardiocirculatory causes from digestive pathologies (acute generalized peritonitis), polytrauma and severe head trauma. Other associated factors were the inadequacy of the technical platform, the delay in diagnosis and treatment, poverty, and the severity and complexity of the pathologies.

This high mortality rate requires advocacy for material and personnel resources to improve the quality of care and reduce the number of avoidable deaths; better organization of intensive care (several medical and paramedical teams with 8 hours of work per day for the paramedics); raising the population's standard of living to reduce poverty and increase income for better health care and the introduction of universal health insurance, which is in the process of being implemented in the country; and the establishment of a SAMU (emergency medical service) and better organization of the emergency department.

## Conflicts of Interest

None of the authors have any conflicts of interest.

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