

## Original Research Article

## Evaluating the Use of Preoperative Antibiotic Prophylaxis in Scheduled Surgeries at the Regional Hospital (RH) of Maradi

Mamane Maikassoua<sup>1\*</sup>, Maman Bachir Abdoulaye<sup>2</sup>, Ousseini Adakal<sup>3,2</sup>, Oumou Kimso<sup>4,3</sup>, Ibrahim Mounkaila<sup>5,4</sup>, Mohamed Rouga<sup>4</sup>, M. S. Chaibou<sup>5</sup>

<sup>1</sup>Anesthesia Resuscitation and Emergency Department, Faculty of Health Sciences, Dan Dicko Dankoloudo University of Maradi Niger

<sup>2</sup>Surgery and Surgical Specialities Department, Faculty of Health Séance, Dan Dicko Dankoloudo University of Maradi Niger

<sup>3</sup>Medical Oncology Department, Maradi Referral Hospital Niger

<sup>4</sup>Surgery Department, Regional Hospital of Maradi Niger

<sup>5</sup>Anesthesia Resuscitation and Emergency Department, Faculty of Health Sciences, Abdou Moumouni University of Niamey Niger

**Article History**

Received: 22.09.2021

Accepted: 07.11.2021

Published: 12.11.2021

**Journal homepage:**<https://www.easpublisher.com>**Quick Response Code**

**Abstract: Purpose:** The use of antibiotic prophylaxis in surgery is to prevent infection of the surgical wound. Although its principles follow specific guidelines, inappropriate practice is often observed. The aim of this study is to evaluate the use of prophylactic antibiotics in the operating room of the RH of Maradi (Niger). **Methodology:** This was a prospective and descriptive study done over a period of 12 months; from the 1<sup>st</sup> of January to December 31, 2020. We studied patients admitted to the operating rooms for Surgical Wound Classification (SWC) I and II scheduled surgeries. **Results:** We collected 286 patients of which 68.53% were male with a mean age of 27.1 years. Patients were SWC I and II. Abdominal, genito-urinary and ortho-trauma surgeries were the most performed. 96.15% of patients received antibiotic prophylaxis. Six patients were already on antibiotics and five patients received none. Ceftriaxone was the most widely used drug. The delay between administration and incision was 30 min or more in only 6.18% of patients. More than half of our patients had received the antibiotic less than 30 min before the incision (57.81%). Postoperative complications were infectious in 60% of cases, 80% of which were surgical site infections. Infectious complications occurred in patients who received their 1<sup>st</sup> round of antibiotics after incision and the rest within 15 min which preceded the incision. **Conclusion:** Strict and rigorous respect of preoperative antibiotic prophylaxis protocols in the operating room is a daily challenge, while the fight against nosocomial infections and bacterial resistance remains a major concern.

**Keywords:** Evaluation, preoperative antibiotic prophylaxis, regional hospital, Maradi.

**Copyright © 2021 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

## INTRODUCTION

Preoperative antibiotic Prophylaxis (PAP) plays a major role in the prevention of surgical site infections. This therapeutic technique applies to certain “clean” or “clean/contaminated” surgeries [1]. Infection is a permanent risk in surgery and pathogenic bacteria are found in more than 90% of operative wounds upon closure [2]. This occurs no matter the surgical technique and no matter the environment. Surgical site infections are a major cause of morbidity, mortality and costs increase of surgery. The objective of preoperative antibiotic prophylaxis (PAP) in surgery is to oppose bacterial proliferation in order to reduce the risk of infection of the surgical site [3]. In 2018, the French Society of Anesthesia and Intensive Care Medicine (SFAR) published an update of the guidelines relating to PAP [4]. Although the principles of antibiotic

prophylaxis are, well defined, inappropriate practices are often observed. These divergences from good practice are probably more frequent in sub-Saharan Africa and specifically in remote areas. The objective of this study was to evaluate the use of antibiotic prophylaxis in programmed surgeries, at the Regional Hospital of Maradi.

## PATIENTS AND METHOD

This was a 12 month long (from January to December 2020), observational and descriptive prospective study where patients admitted to the operating room for a scheduled surgery, classified as SWC I and II were included. Patients whose surgery was classified as “contaminated” or “dirty” were excluded from the study. The variables studied were:

- Sociodemographic

- Indications for surgery and type of surgery
- Time of administration of antibiotics in relation to the incision
- Duration of the surgery
- Second dose of treatment
- Duration of antibiotic administration
- Type of antibiotic used
- Per and postoperative complications
- Length of hospital stay

Data was collected on a survey sheet established for this purpose. An independent investigator filed out these surveys. Administration time of any product given to the patient in the operating room was mentioned on the chart. The investigator

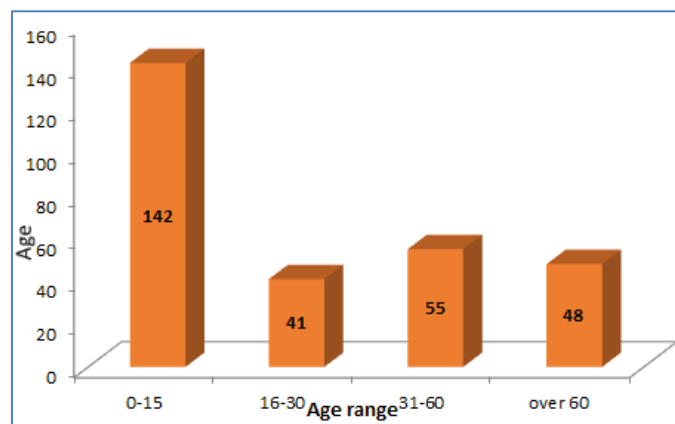
followed every patient until they were discharged from the hospital.

Data entry and analysis were done by Word and Excel 2010 software. The informed consent of all patients was previously acquired and their anonymity was respected.

## RESULTS

### • Patient data

During our study period, 433 patients had undergone planned surgery. Were included 286 patients of which 68.53% were male, with a sex ratio of 0.46. The mean age of the patients was 27.1 years with extremes ranging from 5 days to 90 years? The age group 0-15] was the most represented. Figure 1 shows the distribution of patients by age group.

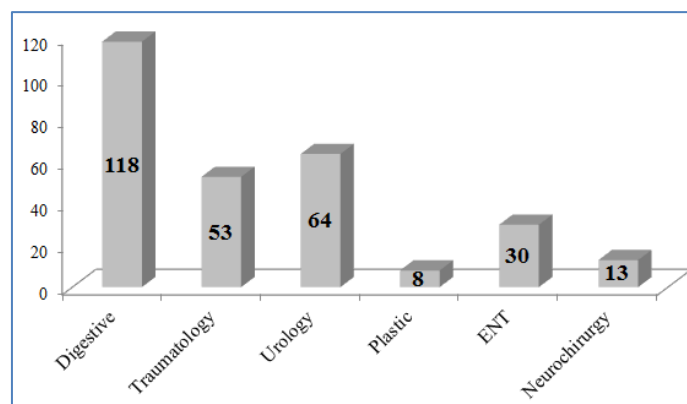


**Fig-1: Distribution of patients by age group**

Pre-anesthetic consultation was systematic for all patients. Some patients had past medical histories. The majority of patients were SWC 1 and 2.

### • Surgery data

The most common type of surgery was digestive surgery followed by urogenital and traumatic/orthopedic surgery. Hernial repairs were the most frequent, representing 53.38% of digestive surgeries. Figure 2 shows the distribution of patients by surgery type.



**Fig-2: Patients according to the type of surgery**

All surgeries were essentially SWC class I (86.3%) and II (13.7%). The average length of surgery

was 48.91 min with extremes ranging from 10 min to 200 min.

- Data on preoperative antibiotic prophylaxis**  
 Antibiotic prophylaxis was given in 96.15% of patients. Six patients were already on antibiotic therapy and five patients did not receive any antibiotics. No one

received a second dose of antibiotics during surgery. Two types of drugs were administered. They were ceftriaxone (92.7%) and ampicillin (07.3%).

**Table-1: Distribution of patients according to the type of antibiotic administration and the type of drug used**

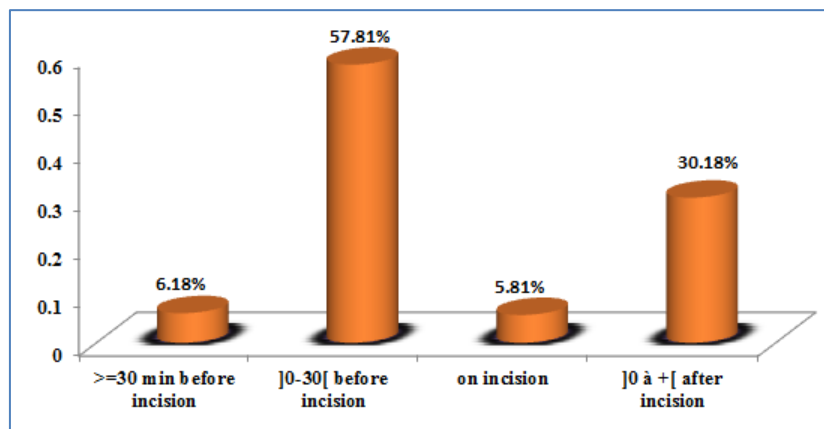
Type of antibiotic therapy	Ceftriaxone	Ampicillin	Metronidazole	total
Antibiotic Prophylaxis	255	20	0	275
Antibiotic Therapy	6*	0	6*	6
<b>Total</b>	<b>261</b>	<b>20</b>	<b>6</b>	<b>281</b>

\*Antibiotic combination

In total, an antibiotic was given to 281 patients.

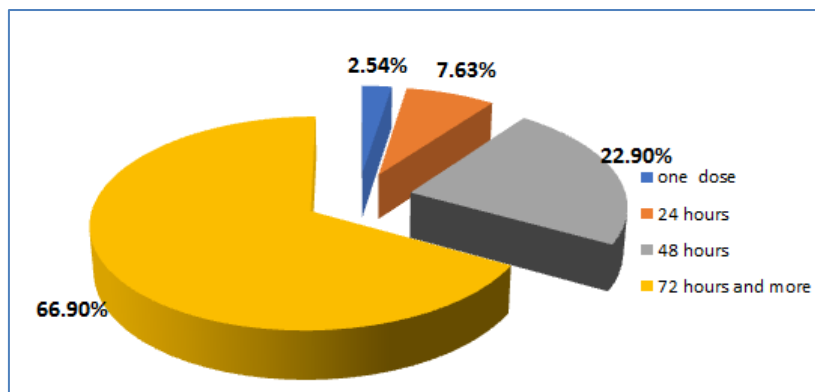
Only 6.18% of patient’s antibiotic prophylaxis 30 min or more before incision. More than half of our patients had received the antibiotic less than 30 min

before the incision (57.81%). The representation of patients between the time antibiotic was administered and the incision period is shown in Figure 3.



**Fig-3: Delay between the time antibiotics were given and time of incision**

The duration of the antibiotic prophylaxis is detailed in figure 4.



**Fig-4: Distribution of patients according to the duration of antibiotic prophylaxis**

- Data on the outcome of patients**  
 During this study, we reported a certain number of events during surgery. They were low blood pressure in eight patients, four spinal anesthesia failures, one case of bradycardia, and two deaths on the operating table.

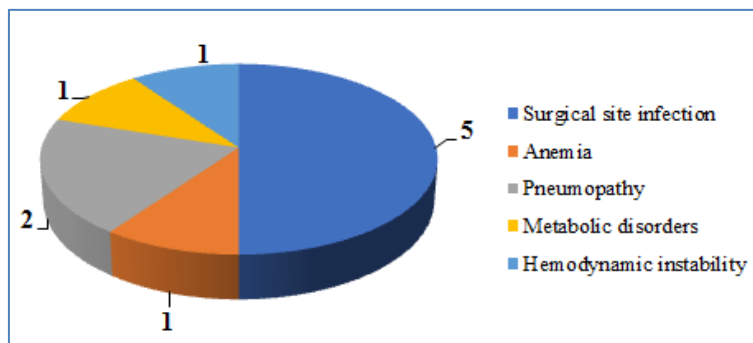
Twenty-five patients had postoperative complications. Suppurations from operative wounds were the most frequent. Table 2 gives us the distribution of patients according to the different types of postoperative complications.

**Table-2: Distribution of patients according to the types of postoperative complications**

Postoperative Complications	Number
Surgical site infection	12
Anemia	4
Pneumonia	3
Metabolic disorders	3
High blood pressure	2
Hemodynamic instability	1
<b>Total</b>	<b>25</b>

Because of these complications, ten patients died. Figure 4 shows us the distribution of patient

deaths according to the etiology. We notice that surgical site infections were the leading cause of death.



**Fig-4: Distribution of patients by cause of death**

Surgical site infections were responsible for 50% of deaths. These infections had occurred in patients who received their dose of antibiotics after the surgical incision.

The length of hospitalization ranged from 6 hours (4.56%) to 23 days with a mean of  $4.6 \pm 2$  days. Infected patients had the longest stay.

## DISCUSSION

The use of antibiotics in scheduled surgeries at the regional hospital of Maradi does not comply with several recommendations in the matter [4-8]. During this study, 96.15% of patients received antibiotic prophylaxis while 1.75% did not. Only two types of antibiotics were used: mainly ceftriaxone and ampicillin. This inappropriate practice has been described in several studies both in Africa [9] and in western countries [10]. This could be explained in our context by limiting factors such as the absence of an in-hospital pharmacy and the cost of certain drugs. Basically, when two drugs are equally effective, the practitioner must and will choose the cheapest product [1].

Ceftriaxone was the antibiotic that was used the most (92.7% of cases). The amino penicillin/beta lactamase-inhibitor combinations, which the 2018 SFAR guidelines recommend, were not prescribed. MUKENGA and col. [11] found similar results and it can be explained by the readily availability of ceftriaxone at the high cost of aminopenicillins/beta-lactamase inhibitors based

antibiotics, and this also applies to other recommended products such as cefazolin and vancomycin which, beyond their very high cost (vancomycin), are difficult to find.

The aim of antibiotic prophylaxis is to limit bacterial proliferation by ensuring a sufficient concentration of antibiotics at the time of incision and throughout the surgical procedure. For this to happen, the antibiotic must be given 30 to 60 minutes before the incision [1]. In our study, antibiotic prophylaxis was administered before incision in 64% of patients, and only 6.18% of patients received it 30 minutes or more before incision. N'SINABAU EYAY and col. in Congo had found results close to ours [1 2]. This fact could be explained by organizational problems and the absence of a functioning pharmacy hospital at the RH of Maradi. In addition, the family's limited finances could have a significant impact on this practice. Indeed, the delay in the availability of prescribed drugs confirms these findings. Similar results have been found in Burkina Faso [9, 1 3]. In 2014, a French study found that it complied with guidelines (indication, administration time, molecule, dosage, and reinjection) in only 13.9% to 55.3% of interventions [14].

Antibiotic prophylaxis should be given for a short period of time, usually during surgery, sometimes 24 hours, and exceptionally 48 hours after [15]. Aiming for a shorter administration time if circumstances allow. This time interval was observed in our study only in 33.1% of cases. It lasted 72 hours or longer in 66.90% of cases when guidelines proscribe the use, in any circumstance, for over 48 hours [1]. The

deficiencies in strict aseptic technics in the operating room added to the staff's insufficient knowledge of the principles of antibiotic prophylaxis might be the cause of such practices.

With strict aseptic measures, antibiotic prophylaxis is one of the essential arms in the fight against surgical site infections, which, in surgery, constitutes a major public health problem. In our study, 12 patients had shown signs of surgical site infection, 4.36% of which received preoperative antibiotic prophylaxis. This postoperative complication accounts for about 50% of all complications. In addition, it was responsible for 50% of deaths. These patients had the longest hospital stay. Non-compliance with the recommendations on good antibiotic prophylaxis practices could explain these results. Indeed, guidelines regarding the use of preoperative antibiotic prophylaxis [4-8] are clear and focus on the following aspects:

- Strictly respect of indications and validated regimens
- Respect the administration guidelines
- Intravenous injection 1 to 2 h before skin incision ( in practice at the time of anesthetic induction)
- Injection of adequate doses and never less than the standard therapeutic dose
- Duration of the antibiotic prophylaxis must be limited to that of the surgery, sometimes 24 hours afterward and never exceeding 48 hours.

## CONCLUSION

This study allowed us to observe that the RH of Maradi does not comply with good clinical practice for preoperative antibiotic prophylaxis. Strict and rigorous respect of preoperative antibiotic prophylaxis protocols in the operating room is a daily challenge, while the fight against nosocomial infections and bacterial resistance remains a major concern; particularly if we pay attention to the negative impact that surgical site infections have on morbidity and death. This is why it is necessary to implement measures to optimize the compliance of the health professionals to national and international guidelines.

## REFERENCES

1. Duclos, G., Zieleskiewicz, L., Antonini, F., Mokart, D., Paone, V., Po, M. H., ... & Leone, M. (2018). Implementation of an electronic checklist in the ICU: Association with improved outcomes. *Anaesthesia Critical Care & Pain Medicine*, 37(1), 25-33.
2. National Nosocomial Infections Surveillance System. (2004). National Nosocomial Infections Surveillance (NNIS) system report, data summary from January 1992 through June 2004, issued October 2004. *Am J infect control*, 32, 470-485.
3. Burke, J. F. (1961). The effective period of preventive antibiotic action in experimental incisions and dermal lesions. *Surgery*, 50(1), 161-168.
4. SFAR. (2018). Antibiotic prophylaxis in surgery and interventional medicine (adult patients). Update of 2018 recommendations.
5. Cpias Nouvelle-Aquitaine. (2017). Tutorial n ° 7. Antibiotic prophylaxis. December 2017. [https://youtu.be/r6q\\_-DuzTzw](https://youtu.be/r6q_-DuzTzw)
6. Qualirel Santé network. (2016). Assessment of Regional Professional Practices on Antibiotic Prophylaxis in Surgery. EPP RANCH. May 2016.
7. Qualirel Santé network. (2019). Cpias Pays de Loire, Med Qual, Omedid Pays de Loire. Assessment of Regional Professional Practices on Antibiotic Prophylaxis in Surgery - EPP RANCH 2nd round - Regional synthesis. January 2019
8. Société Française d'Anesthésie et de Réanimation. (2011, February). Antibioprophylaxis in surgery and interventional medicine (adult patients). Actualization 2010. In *Annales francaises d'anesthesie et de reanimation* (Vol. 30, No. 2, pp. 168-190).
9. KB KI. (2016). Evaluation of the practice of antibiotic prophylaxis in surgery at the Charles De Gaulle pediatric university hospital in Ouagadougou. *Burkina medical*, 21(2)
10. Lallemand, S., Albin, C., Huc, B., Picard, A., Roux, C., Thomas, A., ... & Talon, D. (2001, June). Antibiotic prophylaxis and surgery. Prescription compliance in Franche-Comté with the national reference system. In *Annales de chirurgie* (Vol. 126, No. 5, pp. 463-471).
11. N'sinabau, E. (2020). Antibiotic prophylaxis evaluation at the General Reference Hospital of N 'djili / ISTM-Kinshasa. *Congosciences*, 8(1).
12. Mukenga, M. (2015). Antibiotic prophylaxis in a surgical environment in Mbuji-Mayi: between standards and realities. Experience of Dipumba Hospital (Mbuji-Mayi, Kasai-Oriental, DR Congo). *Journal Congosciences*, 5(1), 24-30.
13. Traoré, I.A. (2012). Assessment of knowledge and practices on antibiotic prophylaxis in the city of Bobo Dioulasso (Burkina Faso). *RAMUR*, 17(3); 56-61.
14. Martine, A. (2016). Relevance and prevention of the risk of infection in surgery: compliance with the recommendations on surgical antibiotic prophylaxis and skin preparation for the operated on. GCS CAPPS Rennes 02/12/2016
15. Edwards, F. H., Engelman, R. M., Houck, P., Shahian, D. M., & Bridges, C. R. (2006). The Society of Thoracic Surgeons practice guideline series: antibiotic prophylaxis in cardiac surgery, part I: duration. *The Annals of thoracic surgery*, 81(1), 397-404.

**Cite this article:** Mamane Maikassoua *et al* (2021). Evaluating the Use of Preoperative Antibiotic Prophylaxis in Scheduled Surgeries at the Regional Hospital (RH) of Maradi. *EAS J Anesthesiol Crit Care*, 3(6), 105-109.