CME LIVE OPEN ACCESS

Journal of
Clinical Anesthesia and Research

Research Article

Profil Epidemiologique Et Bacteriologique des Infections Nosocomiales a L'hopital Provincial General De Reference De Kinshasa

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Received: 2023 Oct 20 **Accepted:** 2023 Nov 13 **Published:** 2023 Nov 28

Abstract

Introduction: Nosocomial infections pose a real public health problem due to their frequency, severity and high socio-economic cost. They constitute a socio-economic and health burden for patients and families. Patients in intensive care are the most exposed.

Objective: The objective of our study was to evaluate the extent of nosocomial infections in the intensive care unit of the provincial general reference hospital in Kinshasa.

Material and methods: This was a descriptive, analytical and observational study using standard medical bacteriology techniques which took place from February 22, 2017 to February 22, 2018 in the HPGRK intensive care unit.

Results: The study included 80 patients with an average age of 35.8 years, predominantly female [with a ratio of 1.35]. The frequency of nosocomial infection in intensive care was 13.75%; the duration of onset of infection varied from 3 to 24 days of hospitalization. We isolated 16 germs in these 80 samples taken from patients, the main ones being Staphylococcus aureus and Escherichia coli. Surgical site infections [SSI] were the most frequent with 43.48% followed by urinary infections with 34.78% and finally bacterial blood infections 21.74%. Ciprofloxacin and norfloxacin showed a high rate of sensitivity.

Conclusion: Nosocomial Infections at the Provincial General Reference Hospital of Kinshasa are very common and constitute a real health problem in our hospitals.

Keywords: Nosocomial Infection, Hospital Environment, HPGRK.

1. Introduction

Nosocomial infections [NI] or hospital infections are infections acquired in a healthcare establishment and during hospitalization which were neither present on admission nor in incubation at the time of hospitalization. Any infection developing within at least 48 hours, extending up to 30 days in the case of surgical site infection [SSI] and up to 1 year if there is an infection, is considered a nosocomial infection. in place of prosthetic materials [1]. Indeed in 2003, a European consensus approach suggested a delay of at least 2 days during admission to the intensive care unit, with patients being able to be recruited from the 3rd day [2].

They are known throughout the world and affect both developed and resource-poor countries. They represent a significant burden for the patient and for public health [3-5]. A prevalence survey of nosocomial infections carried out by the World Health Organization [WHO] in 1987 in 55 hospitals in 14 countries representing four WHO regions [Europe, Eastern Mediterranean, South-East Asia and Western Pacific]

showed that on average, 8.7% of hospitalized patients were affected by a nosocomial infection. At any given time, more than 1.4 million people worldwide suffer from hospital-acquired infectious complications. They therefore constitute a major health problem [6].

Among the factors involved in the appearance of nosocomial infections we have: microbial agents including a wide variety of bacteria, viruses, fungi and parasites which can come from another person present in the hospital or from a cross infection or the patient's own flora or an endogenous infection, we also have the vulnerability of the patient with age, immune status, underlying diseases and interventions and finally environmental factors with overcrowding , the concentration of highly vulnerable patients and other [6].

Nosocomial infections have a significant cost, whether financial or human. For example, in intensive care units in Europe, the prevalence reached 28.1% of patients presenting with a healthcare-associated infection [7]. Or in France in hospitals, where 1 in 20 patients contracts an infection that they did not have when they arrived, or around 750,000 cases each year [8].

Nosocomial infection constitutes a real problem in intensive care due to its frequency, its severity and its high socio-economic cost [9].

Intensive care patients are the patients most exposed to nosocomial infections due in particular to two factors [1].

- Exogenous factors represented by exposure to invasive devices which bypass the patient's natural means of defense [such as endotracheal intubation, placement of central venous catheters, etc.]. These are the factors most accessible to prevention, particularly those linked to the intensive care environment.
- Endogenous factors that are difficult to prevent, such as age, the existence of sometimes decompensated comorbidities, organ failure and genetic factors

Nosocomial infection is therefore a major source of complications in intensive care. This was demonstrated by the EPIC II study in 2009, highlighting a double increase in the mortality of patients arriving infected in intensive care compared to those arriving uninfected [10].

In the Democratic Republic of Congo [DRC] and more particularly in Kinshasa, we have little published work on nosocomial infections. According to the documentation in our possession, in the DRC, only KASONGO et al. conducted a study on the prevalence of nosocomial infections in the intensive care, surgery, internal medicine, gyneco-obstetrics and pediatric departments of two university hospitals in Lubumbashi and found a prevalence of 34.5% with a mortality rate of 30% [11].

At the end of all the preceding considerations, it is up to us to know what the frequency of nosocomial infection could be in the intensive care unit of a large medical institution that is the Provincial General Reference Hospital of Kinshasa.

2. Materials and Methods

2.1. Type of study, setting and period

This is a descriptive, analytical and observational study. It was carried out in the Intensive Care Unit of the Provincial General Reference Hospital of Kinshasa. The present study covered a 12-month period from February 22, 2017 to February 22, 2018 [12-36].

2.2. Study population

Our sample being of convenience, we considered all patients hospitalized in the HPGRK intensive care unit without distinction of sex or age during the study period who met the selected inclusion criteria.

2.3. Sampling

Sampling technique: We used non-probability convenience sampling.

Inclusion criteria: Any person interned in the HPGRK intensive care unit for more than 48 hours during our study period and who does not have a suspected or documented infection upon admission.

Exclusion criteria: Est exclu de notre étude, toute personne n'ayant pas rempli les critères d'inclusion.

2.4. Sample size

The sample size was estimated for convenience. 80 subjects were the subject of our study from whom the various biological products were collected [urine, blood and purulent secretions] from a population of 701 patients received in the HPGRK intensive care unit during our study period.

2.5. Organic product

Morning urine samples collected in a sterile bottle either from the patient's collection bag, venous blood in patients presenting after more than 48 hours of hospitalization in the intensive care unit, a fever and the purulent sample constituted our biological material.

For reasons of compliance, in our work we considered any infection originating from samples other than urine and blood as infection of the surgical site.

2.6. Laboratory materials and reagents has Materials

1) for sampling: [blood cultures, ECBU, swabs, invasive devices]

- Exam voucher;
- The hydroalcoholic hand product;
- Pairs of sterile gloves;
- a disinfected tourniquet;
- An alcoholic antiseptic;
- 2 bottles of back alert;
- 2 sterile 10 cc syringes for sampling;
- A sterile field;
- a waste disposal device;
- a non-alcoholic antiseptic;
- an insulating box;
- a sterile scissor;

- a sterile box;
2) for the analysis:
- Agitator [Vortex Mexin MM-1];
- Platinum handle;
- Precision balance [Mexin DKH-BA];
- Flat-bottomed volumetric flask: 100, 200, 250 and 500ml;
- Glass Petri dish;
- 500ml graduated glass cylinder;
- Oven [Boxum HPX-9272 MBE];
- Sterile glass bottle;
- Pasteur oven;
- Alcohol lamp;
- Pressure cooker [Brand: All American serial code C0001368];
- Pasteur pipettes in rake glass
- Plastic and steel rack;
-Fridge;
-Test tube;
- Platinum handle with loop for seeding and tapered for transplanting identification media.

2.7. Reagents and culture media

Ø Simmons citrate;
Ø Kligler [Hajna];
Ø Indole Urease Mobility [MIU];
Ø Mac-Conckey agar;
Ø MSA [Mannitol Salt Agar].
Ø Kovacs reagent;
Ø Muller Hinton 1;
Ø Fresh blood agar.
Ø Gentian violet solution
Ø Lugol's solution
Ø Safranin solution
Ø Acetone alcohol solution

2.8. Methods

Collection of data from patients interned in the intensive care unit: We went down to the intensive care unit in which all cases were indicative of a nosocomial infection, especially for patients interned for a cause other than that of their admission after 48 hours in the department. Information regarding age, sex and reason for hospitalization was recorded in a register. We also used patient files and data collection sheets.

Transportation of samples: After collecting samples from patients; they were preserved in thioglucolate broth with regard to purulent secretions and sent directly to the bacteriological analysis laboratory service of the hospital [HPGRK] where we handled: inoculation on isolation media then identification of all isolates and antibiogram of strains.

2.9. Cytobacteriological analysis of samples Techniques

a) Urine collection

- Collect urine aseptically in the collection bag,
- Introduce into the clean and sterile bottle

b) Blood sampling

- Wait until the patient has a thermal peak;
- Close the tourniquet after having previously disinfected the part to be sampled;
- Remove 2 to 5ml of blood then introduce directly into the blood culture bottle.

c) Purulent sample

- Using a sterile swab, soak the entire part of the cotton wool with purulent secretions;
- Introduce directly into the tube containing the nutrient broth.

2.10. Coloration de Gram

Principle: The Gram staining technique allows bacteria to be classified into 2 groups according to their dyeing properties. Gram-positive bacteria are colored purple or blue. Gram-negative bacteria are colored pink or red. The result of this examination guides us in the choice of culture medium and in assessing the mode of grouping of bacteria as well as their density in a pathological product.

2.11. Materials and reagents

- Microscope
- Object holder blade
- Platinum handle
- Immersion oil
- Gentian violet
-Lugol
- Acetone alcohol
- Safranin

2.12. Operating Mode

- Cover the preparation with the gentian violet solution and leave to act for one minute; wash in tap water and drain
- Etch the preparation with a few drops of Lugol's solution, leave in contact for 45 seconds after washing gently with tap water,
- Bleach with 95% alcohol or with the alcohol-acetone mixture until the blue color completely disappears, wash gently with tap water,
- Cover the preparation with the second coloring safranin for 1 minute washed gently with tap water.
- Dry in the open air and observe under a microscope using a 100x objective

Lecture: Gram-positive bacteria keep the purple or blue color and Gram-negative bacteria are colored pink or red.

2.13. Seeding

Principle: This involves culturing the biological sample under aseptic conditions in order to isolate the bacteria responsible for the urinary infection after 24 hours of incubation at 37°C.

2.14. Operating mode

1st day: Seeding on solid media

- Using a previously flamed platinum loop, take a small quantity of inoculum,
- Inoculate simultaneously in exhaustion streaks on Blood Agar, Mac Conkey, Chapman Agar and Sabouraud Agar,
- Incubate the plates at 37°C or 30°C for 24 to 48 hours

2nd day: Reading and copying

- On Mac Conkey agar, the lactose-positive colonies were transplanted to different Kligler, Simmons Citrate and Mobility –Indole –Urease identification media;
- On MSA the suspicious colonies were subjected to Staphylocoagulase tests;
- On Sabouraud agar, the suspicious colonies [creamy appearance] were transplanted into a hemolysis tube containing human blood serum for the filemantation test;
- On Muller Hinton all strains have been subjected to sensitivity tests to common antibiotics.

3rd day reading: Reading on the medium for identification and antibiogram.

2.15. L'identification

Is carried out according to the classic scheme of clinical bacteriology by combining the different biochemical tests for Enterobacteria, the coagulase test for Staphylococcus aureus, and the filamentation test for Candidaalbicans.

2.17. Antibiogram

Principle: It consists of placing the bacterial culture in the presence of the antibiotic[s] and observing the consequences on the development of the bacteria. After culture and deposit of the antibiogram disks, there are three types of interpretation depending on the diameter of the inhibition zone around the antibiotic disk: sensitive, intermediate or resistant strain of bacteria.

2.18. Operating mode:

- Place physiological water sterilely in a hemolysis tube;
- Take a pure colony and suspend it until an opacity of 0.5 Mac Farland is obtained;
- If the suspension is too cloudy, adjust the opacity by adding physiological water;
- Take the Mueller-Hinton agar, check the absence of water on the surface; if there is any, let it dry;
- Dip the swab in the suspension, remove excess inoculum by pressure on the edges of the tube;
- Regularly swab the agar by rotating the plate 60° until the entire surface is inoculated;
- Leave to dry for 3 to 5 minutes;
- Place the antibiotic disks at an interval of approximately 15mm;
- Incubate for 24 hours.

Lecture: On Muller Hinton, we measure the zone of inhibition for a sensitive bacterium which will be compared to the standards according to the standards of the French antibiogram society. A sensitive strain is a strain that can be affected by systemic treatment at the usual dose. An intermediate strain is a strain that can be reached by a particular physiological concentration [urine, etc.]. A resistant strain is one that is unlikely to respond to any type of treatment.

2.19. Test Coagulase

Principle: It is a technique which consists of the detection of the cellular enzyme secreted in a specific manner by staphylococcus aureus and is capable of coagulating in vitro in blood serum.

2.20. Operating mode:

- Next to an alcohol lamp and using a platinum loop, take a suspicious bacterial colony;
- Emulsify with a drop of blood serum previously placed in the center of a slide;
- Observe with the naked eye.

2.21. Reading mode:

- If after one to three minutes of contact there is production of aggregates, the test is positive, it is staphylococcus aureus;
- If there is no formation of an aggregate within two to three years, the test is negative.

2.22. Filamentation test

Principle: The strain to be tested is emulsified in serum. After three hours of incubation in the oven at 37oC, we observe under a microscope, the Candida albicans cell presents a germination tube characteristic of the species [37].

2.23. Reagents:

Plasma "o": Dissolve the contents of a vial in 0.5ml or 3.5ml of sterile distilled water.

2.24. Operating mode:

- Distribute 0.5ml of plasma "o" in a hemolysis tube,
- Emulsify a sufficient quantity of culture to obtain a slight opalescence [note 2]
- Incubate the tube in an oven at 37oC for three hours,
- Examine a drop of the suspension between slide and coverslip under the microscope.

3. Result

If it is Candida albicans, a certain number of cells have a germination tube, a characteristic glove shape.

This tube, unlike the usual bud, does not have a constriction at its base, it extends the cell, without separation or visible membrane.

3.1. Data Entry and Analysis

The data were entered into EXCEL 2010 software and transferred to SPSS version 21.0 software for statistical and descriptive analysis.

3.2. Ethical Considerations

The principles of anonymity and confidentiality were respected at all stages of our study. No conflicts of interest were reported.

Results: In our study, the results are oriented in the identification of nosocomial infections in a medical institution. The results are thus represented in the form of the following tables. The results are thus represented in the form of the following tables. A total of 701 patients were received in the Intensive Care Unit during the period of our study, 80 of whom presented clinically with a nosocomial infection.

Table 1: Frequency of Nosocomial Infections in Patients

Variables	n	%
Patients infectés	11	13,75
Patients non infectés	69	86,25
Patients inclus	80	100
Patients exclus	621	
Patients admis	701	

This table tells us that 11 out of 80 patients admitted to intensive care, or 13.75%, saw their samples of biological products given positive cultures and 69, or 86.25%, gave negative cultures.

3.3. Sociodemographic Variables

Table 2: Distribution of Patients According to Sociodemographic Characteristics

Variables		Total	
		Ni	%
Tranches d'âge	1 - 12	19	23,75
	13 - 24	5	6,25
	25 - 36	16	20,00
	37 - 48	15	18,75
	49 - 60	13	16,25
	61 - 72	7	8,75
	71 - 84	5	6,25
Sexe	masculin	34	42,50
	Féminin	46	57,50
Séjour en réanimation	3 - 12	25	31,25
	13- 24	55	68,75

The majority of patients were in the age group of 1 to 12 years [23.75%], the average age calculated at 35.8 years [35.8± 22.16] with the extremes ranging from 1 to 83 years old. the female gender was predominant [57.50%] with a sex ratio of 1.35; the average stay calculated at 14.8 days, the majority of patients [68.75%] had a stay longer than 12 days.

3.4. Data on Identified Germs and Antibiogram

Table 3: Frequency of Germs Identified

Germes	ni	%
Staphylococcus aureus	43	46,74
Escherichia coli	16	17,39
Staphylococcus sp	4	4,35
Klebsiella oxytoca	4	4,35
Klebsiella pneumoneae	4	4,35
Klebsiella ozaenae	3	3,26
Enterobacter	3	3,26
Proteus mirabilis	3	3,26
Candida albicans	2	2,17
Pseudomonas sp	2	2,17
Pseudomonas aeruginosa	2	2,17
Streptococcus sp	2	2,17
Enterobacter gergoviae	1	1,09
Proteus vulgaris	1	1,09
Citrobacter sp	1	1,09
Serratia marcscens	1	1,09
TOTAL	92	100

Of all the germs isolated in our samples, Staphylococcus aureus was the most encountered germ with 43 cases or 46.74%, followed by Escherichia coli 17.39% and the others.

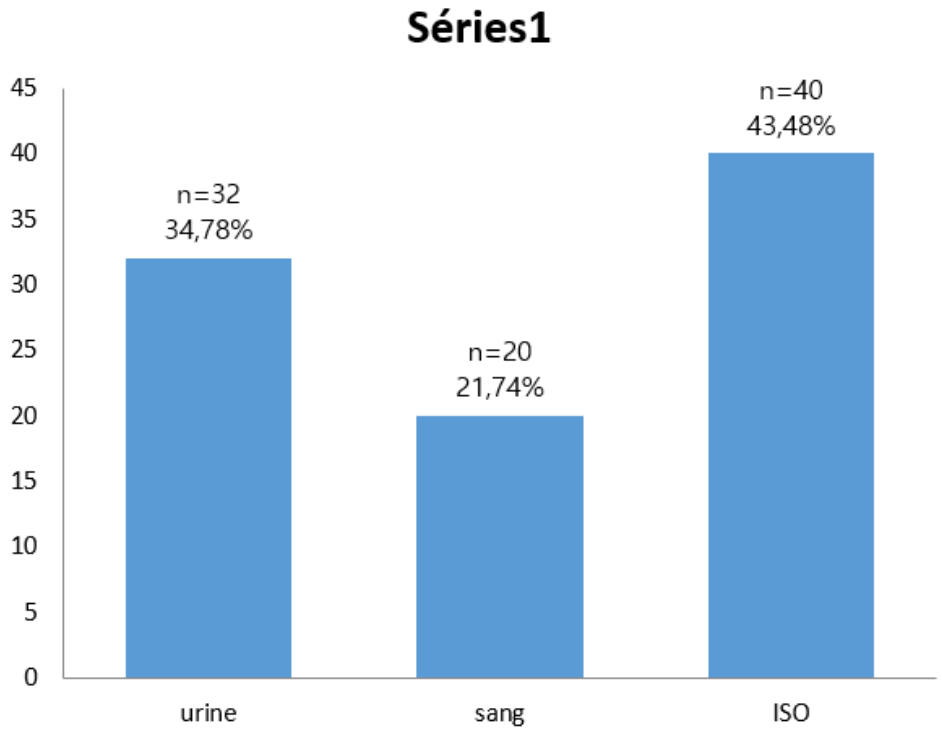

Figure 1: Distribution According to Types of Organic Products

Surgical site infections [SSI] were the most frequent with 43.48% followed by urinary infections with 34.78% and finally bacterial blood infections 21.74%.

Table 4: Distribution of germs according to types of organic products

Germes	Urines		Sang		ISO		Total
	Ni	%	ni	%	ni	%	
Staphylocoque aureus	13	30,23	11	25,58	19	44,18	43
Escherichia coli	5	31,25	5	31,25	6	37,5	16
Staphylocoque sp	1	25	0	0	3	75	4
Klebsiellaoxytoca	3	75	1	25	0	0	4
Klebsiellaozaenae	0	0	3	100	0	0	3
Enterobacter	2	66,66	0	0	1	33,33	3
Proteus mirabilis	2	66,66	0	0	1	33,33	3
Pseudomonas sp	0	0	0	0	2	100	2
Streptocoque	0	0	0	0	2	100	2
Candida albicans	2	100	0	0	0	0	2
Pseudomonas aeruginosa	0	0	0	0	2	100	2
Enterobactergergovia	1	100	0	0	0	100	1
Citrobacter	0	0	0	0	1	100	1
Serratiamarcscens	0	0	0	0	1	100	1
Klebsiellapneumoniae	2	50	0	0	2	50	4
Proteusvulgaris	1	100	0	0	0	0	1
Total	32	34,78	20	21,74	40	43,48	92

Looking at this table we note that of the 92 germs identified we have 32 germs or 34.78% which come from urine, 40 germs or 43.48% which come from purulent samples and 20 germs or 21.74% come from blood samples.

Table 5: Sensitivity and Resistance of Cocci to Antibiotics

Antibiotiques	Abréviation	AB	Staphylococcus aureus		Streptococcus sp		Total
			Urine	Sang	ISO	ISO	
Cefotaxime	CTX	S	4	4	5	1	14
		I	3	1	6	1	11
		R	6	6	8	0	20
Bactrim®	BA	S	-	-	-	-	0
		I	-	1	1	-	2
		R	13	10	18	2	43
Gentamicine	GN	S	-	-	-	-	0
		I	1	3	1	-	5
		R	12	8	18	2	40
Tétracycline	TE	S	-	-	-	-	0
		I		2	2		4
		R	13	9	17	2	41
Chloramphénicol	C	S	-	-	-	1	1
		I	2	6	2	-	10
		R	11	5	17	1	34
Pénicilline	P	S	1	-	-	1	2
		I	-	1	1		2
		R	12	10	18	1	41
Erythromycine	E	S	5	7	9	-	21
		I	2	2	6	1	11
		R	6	2	4	1	13
Norfloxacine	NOR	S	4	-	6	1	11
		I	7	7	10	1	25
		R	2	4	3	-	9
Ciprofloxacine	CIP	S	11	8	16	1	36
		I	1	-	3	-	4
		R	1	3	-	1	5

This table shows that Bactrim® presents 43 strains or 95.55% resistance, followed by Tetracycline and Penicillin 41 strains or 91.11 resistances then Gentamicin 40 strains or 88.89% resistance for the coccal strains in our study. Sensitivity is high with 36 strains or 80% for ciprofloxacin, followed by 21 strains or 46.66% for Erythromycin.

Table 6: Gram-Negative Bacillus Antibiogram

AB	ATB	E coli			K oxy		K oz	K pneu		Enterobacter		Prot mir		Tot
		Ur	Sang	ISO	Ur	Sang	Sang	Ur	ISO	Ur	ISO	Ur	ISO	
AMP	S	-	-	-	-	-	-	-	-	-	-	-	-	0
	I	-	-	-	-	-	-	-	-	-	-	-	-	0
	R	5	-	6	3	-	3	2	1	2	1	2	1	26
CTX	S	3	4	3	2	1	1	-	-	-	1	2	-	17
	I	1	1	1	1	-	1	1	-	1	-	-	-	7
	R	1	-	2	-	-	1	1	1	-	-	-	-	6
BA	S	-	-	-	-	-	-	-	-	1	-	-	1	2
	I	1	-	-	-	-	-	-	-	-	-	-	-	1
	R	4	5	6	3	1	3	2	1	2	1	2	1	31
GN	S	-	-	-	-	-	-	-	-	-	-	-	-	0
	I	-	-	-	1	-	-	1	-	-	-	-	-	2
	R	5	5	6	2	1	3	1	1	2	1	2	1	31
TE	S	-	-	-	-	-	-	-	-	-	-	-	-	0
	I	-	-	-	-	-	-	-	-	-	-	-	-	0
	R	-	5	6	-	1	3	-	1	-	-	-	-	16
C	S	-	-	-	-	-	-	-	-	-	-	-	-	0
	I	-	1	-	-	-	-	-	-	-	-	-	-	1
	R	-	5	5	-	1	3	-	1	-	-	-	-	15
NOR	S	2	2	3	3	-	1	1	-	1	-	2	1	16
	I	2	1	3	-	1	-	1	-	1	1	-	-	10
	R	1	2	-	-	-	2	-	1	-	-	-	-	6
CIP	S	4	3	6	2		2	1	1	1	1	1	1	23
	I	1	-	-	-	1	-	-	-	-	-	1	-	3
	R	-	2	-	1	-	1	1	-	1	-	-	-	6

The table above reveals that Bactrim® and gentamicin present 31 resistances, followed by ampicillin with 26 resistances, while ciprofloxacin 23 cases of sensitivity, cefotaxime 17 cases of sensitivity then norfloxacin 16 cases of sensitivity for the strains Gram-negative bacilli tested.

Table 7: Bacillus Antibiogram Results

AB	AB	Pseudsp	Pseudaerugino Gergovia	Enterocb	Citro-bacter	Serratia Marcscens	Protvulga	Total
		ISO	ISO	Urine	ISO	ISO	Urine	
AMP	S	-	-	-	-	-	-	0
	I	-	-	-	-	-	-	0
	R	2	2	1	1	1	1	8
CTX	S	2	1	1	-	-	1	5
	I	-	-	-	-	-	-	0
	R		1		1	1	-	3
BA	S	-	-	-	-	-	-	0
	I	-	-	-	-	-	-	0
	R	2	2	1	1	1	1	8
GN	S	-	-	-	-	-	-	0

	I	1	1	1	-	-	-	3
	R	1	1		1	1	1	5
TE	S	-	-	-	-	-	-	1
	I	-	-	-	-	-	-	0
	R	2	2		1	1	-	7
C	S	-	-	-	-	-	-	2
	I	-	-	-	-	-	-	0
	R	2	2	-	1	1	-	6
NOR	S	1	1	1	1	1		5
	I	1	1	-	-	-	1	3
	R	-	-	-	-	-	-	0
CIP	S	2	2	-	1	1	-	6
	I	-	-	-	-	-	-	0
	R	-	-	1	-	-	1	2

It appears from this table that ciprofloxacin presents 6 cases of sensitivity followed by norfloxacin with 5 cases of sensitivity.

Table 8: Resistance Profile of the Main Germs of Nosocomial Infections

Germes	CTX	BA	GN	TE	C	P	E	Nor	CIP
S aureus	20	43	40	41	34	41	13	9	4
E. coli	1	16	3	4	3	4	3	2	2
S. sp	-	4	3	1	1	-	-	-	1
Kle oxy	1	3	3	3	3	-	-	-	1
Kle oz	-	4	3	1	1	-	-	-	1
Enterob	-	3	3	-	-	-	-	-	1
P. mirabilis	3	3	-	-	-	-	-	-	-
Pseud sp	-	2	1	2	2	-	-	-	-
Strept sp	-	2	2	2	1	-	-	1	1
Pseu aerog		1	2	1	2	-	-	-	-
Citrobact	1	1	1	1	1	-	-	-	-
Serra mar	1	1	1	1	1	-	-	-	-
Kle pneu	2	3	2	1	1	-	-	1	1
Proteus mirab	-	1	1	-	-	-	-	-	-

It appears from this table that the resistance record is at the level of Bactrim® with 43 cases followed by tetracycline and penicillin with 41 cases to strains of Staphylococcus aureus, the same goes for the strain of Escherichia coli with respectively 16 cases and 4 cases.

Table 9: Antibiogram Profile According to the Biological Product

AB	ATB	Urine	Sang	ISO	Total
AMP	S	0	0	0	0
	I	0	0	0	0
	R	14	0	9	23
CTX	S	13	10	10	33
	I	7	7	8	22
	R	8	7	17	32
BA	S	1	0	0	1
	I	1	1	1	3
	R	28	19	34	81
GN	S	0	0	0	0
	I	3	3	2	8
	R	26	17	13	56
TE	S	0	0	0	0
	I	0	2	2	4
	R	13	18	32	63
C	S	0	0	1	1
	I	0	7	2	9
	R	11	14	30	55
P	S	1	0	1	2
	I	0	1	1	2
	R	12	10	19	41
E	S	5	7	9	21
	I	2	2	7	11
	R	6	2	5	13
NOR	S	13	3	14	30
	I	11	9	18	38
	R	3	8	4	15
CIP	S	20	13	26	59
	I	3	1	3	7
	R	5	6	1	12
Total S	53	42,0%	33	32,7%	37,2%
Total R	126		101	61	164

We notice through this table that the proportion between sensitivity and Resistance is low in blood 32.7%, followed by ISO 37.2%, compared to urine 42.0%.

3.5. Vital Outcome of Patients

Table 10: Evolution of patients

Variables	Décès		Survie		Total
	n	%	n	%	n
Patients infectés	7	63,6	5	36,4	11
Patients non infectés	16	23,1	53	76,9	69
Total	22	27,5	58	72,5	80

The mortality rate of our patients was 27.5%. The death rate was higher among infected patients [63.6%] than non-infected patients [23.1%].

4. Discussion

Our study evaluates the frequency of nosocomial infections in the intensive care unit of the provincial general referral hospital in Kinshasa.
After laboratory analyzes we note the following:

4.1 The Frequency of IN

In our study, the incidence of nosocomial infection was 13.75%, frequency comparable to the series by AMAZIAN et al. on the prevalence of nosocomial infections in Mediterranean countries in 2010, which showed that out of 4634 patients admitted to these hospitals, 483 nosocomial infections were detected, or 10.5% [12].

NSIATA et al. in their series at the university clinics of Kinshasa, the Saint Joseph hospital and the HPGRK in 2014 on the prevalence of nosocomial infections, found a frequency of 9.8% which is close to our result [37].

Our series is different from those of OUBIHI et al. in 2015, in the multipurpose intensive care unit of the Avienne hospital in Marrakech on the epidemiology of nosocomial infections in the intensive care unit which found a frequency of 38.9% and the same KASONGO et al in 2016 in Lubumbashi who found 34.5% [38, 14].

In Africa and in our series, this frequency can be explained by the instability of hygiene conditions in hospital institutions and accentuated by the lack of a surveillance system for nosocomial infections as happens in Western countries.

4.2. Distribution of IN According to Age

In our series, the average age of patients was 35.8 years with the extremes ranging from 1 year to 83 years.

Our result is close to that of AMAZIAN et al. in 2010, who in their series found an average age of 41.1 years [12]. On the other hand, our results diverge with the series of LAMRHARY R during his thesis on the predictive factors of nosocomial infections in intensive care in 2016 which found an average age of 60.4 years with the extremes ranging from 18 to 90 years [39-45].

KAHINDO K during his specialization thesis in 2017 reported in his series an average age of 53.7 years with extremes ranging from 18-97 years while Rea Raisin in 2012 reported an average age of 61 ,4 years [46].

This difference could probably be explained by the difference in the characteristics of the samples.

4.3. Germs in question, Organic product, Antibiotic sensitivity and Resistance

In our series, the origin of nosocomial infections remains very varied because a total of 16 germs were isolated from 11 out of 80 patients who clinically presented signs of infection. Among these germs, Staphylococcus aureus came first with an isolation rate of 46.73%, followed by Escherichia coli at 17.39% as shown in Table III.

NSIATA et al. in their series found a frequency of 16.46% of Escherichia Coli as in our study and AMAZIAN et al. reported in their series that the most frequently isolated organisms were Escherichia coli [17.2%], Staphylococcus aureus [16.8%], Pseudomonas aeruginosa and Klebsiella pneumoniae [5.2% each] [12, 37].

In our study, surgical site infections were the most frequent with 42.39% among nosocomial infections followed by urinary infections with 34.78% and finally those from blood samples with 21.74%, this being proven in Table IV of our study unlike the work of AMAZIAN K et al. who in their series, urinary infections took a higher proportion of 25.9% among nosocomial infections, followed by the others [12].

Overall, the resistance rate was quite high in our series. It should be noted that our study focused on hospital germs which are constantly subject to considerable selection pressure. But the observation made is that a low rate of resistance to ciprofloxacin and norfloxacin is observed as seen in Tables V, VI, VII, VIII and IX.

4.4. Evolution of infected patients

In our study, the majority of patients [68.75%] had a stay longer than 12 days. The mortality rate of our patients was 27.5%, more marked in infected patients [63.6%] than non-infected patients [23.1%].

Our result is close to that of KAHINDO K, who found the mortality rate of 29.9%, the death rate was more marked in in-

fected patients than non-infected ones [58.3%].

5. Conclusion

The present proposed study focused on the epidemiological and bacteriological profile of nosocomial infections in a hospital environment in Kinshasa, case of the Provincial General Reference Hospital of Kinshasa.

5.1. After analyzing the data, we can draw the following conclusions

- Nosocomial infection in intensive care was common;
- Women were predominant than men;
- Surgical site infections were the most common;
- Staphylococcus aureus was the most isolated germ, followed by Escherichia coli and the others;
- ciprofloxacin and norfloxacin presented a high rate of sensitivity, but as for the proportion between sensitivity and resistance, it was low in blood, low in ISO compared to urine which becomes higher.

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