

Recommendations on the Fight against Nosocomial Infections Compliance In Health Facilities of Yaounde (Cameroon)

Georgette Ndongo Ekanga^{1,2}, Hortense Gonsu Kamga^{1,3}, Albert Same Ekobo³, William Baiye^{1,4}, Godswill Ntsomboh-Ntsefong⁵ Arthur Essomba^{1,3}, Elias Nukenine²

1. Yaoundé University Teaching Hospital;
2. University of Ngaoundere;
3. University of Yaounde I;
4. University of Buea;
5. Institute of Agricultural Research for Development (IRAD) Yaounde Cameroon

Abstract

Background: Nosocomial infection's (NIs) data are scarce in developing countries. In some of these countries, national guidelines for its prevention by health facilities have introduced surveillance recommendations including Infection Control Assessment Tool (ICAT). The aim of our study was to evaluate the compliance levels of NIs recommendations.

Methodology: We conducted a cross-sectional study from September to December 2018 in 10 health facilities in Yaounde. A checklist with two modules from the ICAT (Health Facility information and Infection Control Program) was used to determine the degree of compliance towards the recommendations by performing interviews, observations and consultation of documents.

Results: Sixty (60) % of health facilities are aware of the national guidelines and regulation on the fight against NIs but only 30% have adopted them. Accreditation standards applicable to health facilities are not known by any of the health facilities. The recommendations concerning demographic characteristics, water supply and the general characteristics on rooms were generally respected (more than 50%) in 90% of the health facilities. 100% of health facilities had less than fifty (50)% compliance level for the fight against NIs recommendations with compliance levels below 15% for 50% of them. This worst compliance (less than 15%) was especially observed with recommended practices concerning responsibilities and authorities (40% of health facilities), functionality of infection and control committees (50% of health facilities), key personnel responsible for fight against NIs (30% of health facilities) and study of outbreaks and surveillance of NIs (100% of health facilities). Training programs on fight against NIs had better scores (30% of health facilities with more than 50% of compliance levels). The Fischer test shows that there is a significant relationship between the compliance with all these recommended practices and the health facility capacity ($P= 0, 0476$).

Conclusion: NIs control programs in Yaounde health facilities are insufficient. Awareness, training, promotion and follow-up actions are necessary for the understanding and adoption of recommendations on the monitoring of NIs.

Keywords: Compliance, Recommendations, Nosocomial Infections, Health Facilities.

Introduction

All the personnel and services involved in health care programs are concerned with prevention of NIs. Indeed, data's on NIs available in Europe and Canada through networks and programs show the geographic distribution and severity of these infections as well as the efficacy of prevention actions. This data are scarce in developing countries where there are only a few national programs. This poses significant public health problems both in terms of medical management and in terms of the qualitative and quantitative inadequacy of appropriate tools and personnel for the identification and monitoring of NIs. In Cameroon, national guidelines and directives on the prevention of nosocomial infections have been developed with

surveillance recommendations that represent “the eyes and ears of public health” (Ministère de la Santé Publique, 2017). It is important to know how health facilities adopt them to fight against this pandemic. The objective of our study was to provide an overview of the functioning of programs to fight against NIs in health facilities by assessing their compliance levels with recommendations on NIs control programs.

Previous research on the subject

Providing quality care involves applying medical science in a way that maximizes the outcomes without increasing risk. Care-related infections -called nosocomial- are at the forefront of care-related adverse events and are now a constant concern in hospital practice and care, in both developing and developed countries (Dao, 2017). They represent a significant burden for the patient as well as for public health. A WHO prevalence survey of 55 hospitals in 14 countries representing four WHO Regions (Europe, Eastern Mediterranean, Southeast Asia and the Western Pacific) showed that, on average, 8.7% of hospitalized patients had a nosocomial infection (OMS, 2008) .

In Africa, the prevalence of nosocomial infections ranges from 10% to 60%, and they are the third leading cause of maternal mortality, the second leading cause of early neonatal mortality, and the first leading cause of postoperative morbidity. This prevalence is estimated at 10.9% in Senegal, 12% in Ivory Coast, 10% in Benin and 14% in Mali (Dao, 2017). The most common NIs are infections of surgical site, urinary tract infections and low respiratory infections. The WHO study and other studies have also shown that the highest prevalence of nosocomial infections is found in intensive care units and emergency and orthopedic surgery departments. A review of NIs in sub-Saharan Africa shows that naturally, any micro-organism can cause hospital infection. However, only a few are responsible for the majority of NIs. *Staphylococcus*, *Escherichia coli*, *Pseudomonas aeruginosa*, enterococci, fungi and viruses. The data available in sub-Saharan Africa show an incidence of NIs in 2 and 49% with the highest rate in intensive Care units patients (21.2-35.6%). NIs prevalence rates range from 1.6% to 28.7% in Burkina Faso, the Republic of Tanzania, Ghana, Mali, Cameroon, Gabon, Uganda, Burundi, the Democratic Republic of Congo and Senegal. In Nigeria and Ethiopia, the number of NIs in surgical services ranges from 5.7% to 45.8%. Moreover, while 3.4-10.9% of hospital infections cause death in most developed countries, these mortality rates are likely to be even higher in Sub-Saharan Africa (Mbim, 2016). Infection rates are also higher among patients made more vulnerable by age, underlying disease or chemotherapy (OMS, 2008) .

Nosocomial infections add to the functional disability and psychological stress of the patient and may in some cases lead to disabling conditions that reduce quality of life. They are also a major cause of death. Their economic cost is considerable. Nosocomial infections therefore exacerbate the imbalance between primary and secondary health care funding by dedicating scarce funds to the management of potentially preventable conditions. Pathogens responsible for these infections can spread to the community through patients discharged from hospital, hospital staff and visitors. When these germs are multi-resistant, they can cause significant morbidity in the community.

The prevention of nosocomial infections involves all the personnel and services in health care. Everyone must contribute to reducing the risk of infection for both patients and staff. The concept of prevention includes health care personnel, management, establishment, provision of equipment and products, and training of health workers. Effective nosocomial infection control programs must be very comprehensive, covering both surveillance and prevention activities and staff training. They must also have effective support at national and regional level.

The competent health authorities should develop a national (or regional) program to help hospitals reduce the risk of nosocomial infections. The prevention of risks to patients and institutional staff is everyone’s responsibility, and should be encouraged at the highest level of administration. An annual work plan should be developed to assess and promote good quality health care, appropriate microbial isolation measures, sterilization and other practices, staff training and epidemiological surveillance. Hospitals will need to provide sufficient resources to support this program.

Such a program is generally implemented by a well-defined committee, including NIs control professionals, and a nosocomial infection control manual that consolidates instructions and health care practices. This important tool must be developed and maintained by the infection control team, reviewed and approved by the committee. It must be made available to caregivers and be regularly updated. In such a program, responsibilities are clearly established for hospital management, physicians, microbiologists, pharmacists, nurses, central sterilization, food service, cleaning and laundry services, technical maintenance and hospital hygiene services. All of them have specific roles and should be actively involved.

The rate of nosocomial infections among patients in a health care facility is an indicator of quality and safety of care. The development of a monitoring process for this rate is the prerequisite for identifying local problems and priorities and for evaluating the effectiveness of infection control activities. Surveillance in itself is an effective process to reduce the frequency of nosocomial infections (OMS 2002). Improved health care is demonstrated by an increase in quality and safety but requires changes in care practices new techniques, surveillance of new pathogens and their antibiotic resistance. This implies the need for active surveillance to monitor the evolution of infectious risks and to identify the need to modify control measures.

Methodology and theoretical framework

The city of Yaoundé has 414 health facilities divided into categories (category 1-6) and types (public, university, military, secular private or private religious). The distribution by category is based on the technical platform, the services available and the capacity of the health facilities. The distribution by type depends on the way the health facility is administered. This cross-sectional descriptive study was conducted from September to December 2018 in ten health facilities belonging to five districts of Yaounde. This study includes health facilities of Yaounde with ward services and bacteriology laboratories performing cultures. About fifty health facilities in the city correspond to this description, hence the choice of 10 facilities to represent the six health districts of Yaounde. One of the health districts did not have a health facility that met our criteria. A checklist of two modules extracted from the 22 constituting the «Assessment Tool for Infection Control» (ICAT) Management Sciences for Health (MSH) and United States (USAID) were used to determine compliance levels of recommendations by these health facilities through interviews, observations and document consultations. The modules evaluated were health facility information and Infection Control Program. These modules were administered once for the facility as a whole. Each module in the ICAT is divided into sections to assess performance in particular areas of practice. The first one, health facility information, gathers information about the overall structure and organization of the facility, awareness and adoption of national infection control guidelines, bed capacity and crowding, adequacy of water supply and availability of separate wards for special populations. It was completed by the facility head physician or nurse. The second module, Infection Control Program reviewed the scope of infection control program activities including applicable government infection control protocols or standard, the nature and the organization of infection control activities, composition and functioning of the infection control committee, key infection control personnel, education programs for staff related to infection prevention and control and infection surveillance practices and reporting. This module was completed by the person in charge of infection control program or the personnel who could best report on infection control activities in the facility. When the interview was completed, the total point values for each section of the module was calculated and entered in a module scoring sheet. Each section had its own possible total score and performance rating. There was also a total score and overall performance rating for the module as a whole. The percentage scores were obtained by making the ratios between the total points obtained in the evaluation by the health facility and the possible total of the section. These scores were used to categorize levels of compliance with recommendations. Less than 50% of points mean that the health facility needs training and follow-up on recommended practices; 50-75% showed that recommended practices were generally followed. For scores over to 75% recommended practices were followed systematically and exhaustively. Ethical

clearance, the authorizations of the various health facility participants, the information note, informed consent of the questionnaire respondents and the anonymity of health facilities were the ethical guarantees of this work. Data analysis was performed by SAS software.

Results

General information on health facilities

50% of the health facilities surveyed were public health facilities of 1st and 2nd category. Sixty (60) % of these health facilities had a total of 76 to 100 beds , 40% of them had an average number of 51 to 75 daily hospitalized patients. Fifteen officials participated in the survey among them three physicians, eight nurses, two epidemiologists and three leaders of NIs control programs.

Sixty (60) % of health facilities were aware of the national guidelines and regulation on the fight against NIs but only 30% have adopted them. Accreditation standards applicable to health facilities are not known by any of the health facilities.

Table 1: General information on health facilities

Information	Categories			Types					Bed capacity				Average number of daily hospitalized patients				National infection control guidelines	
	1st	2nd	4th	Public	University	Military	Secular private	Private religious	1-25	26-50	76-100	More than 100	1-25	26-50	51-76	76--100	Awareness	Adoption
Number of health facilities	4	2	4	4	1	1	3	2	1	1	2	6	3	2	4	1	6	3
Percentage of health facilities	40	20	40	40	10	10	30	20	10	10	20	60	30	20	40	10	60	30

Compliance with recommendations on general health facility characteristics

Recommendations regarding demographics, water supply and general room characteristics were generally met (over 50%) in 70-90% of health facilities.

Table 2: Compliance with recommendations on general health facility characteristics

Information	Adequacy of water supply compliance		Availability of separate wards for special populations (room characteristics) compliance			Compliance with recommendations on general health facility characteristics	
	50-75%	>75%	50-75%	>75%	Non applicable	50-75%	>75%
Number of health facilities	1	9	1	7	2	1	9
Percentage of health facilities	10	90	10	70	20	10	90

All the health facilities involved in the study fully comply with the recommendations regarding the water supply (more than 75% of the score). It came mainly from the public network for 90% of health facilities, and is generally not processed after its arrival in the health facility. Only one the health facilities used rainwater because of frequent interruptions and had it treated by chlorination with bleach in a container. Seventy (70)% of participant health facilities had a room reserved for newborns and separate rooms for labour and delivery, 30% of them did not have a room for newborns (among these health facilities one whose service was closed for renovation works).

Compliance with recommended practices on NIs programs

Fifty percent of health facilities had a compliance level under 15%, twenty percent a compliance level range between] 15-25%] and thirty percent a compliance range between] 25-50%]. The Fisher test shows that there is a significant relation between general compliance on NIs programs and the number of beds. (Table 3)

Table 3: Compliance with recommended practices on fight against NIs programs by health facilities per health facility capacity (number of beds)

NIs programs Percentage	Total number of beds of health facility				Total
	1 - 25 beds	26 - 50 beds	76 - 100 beds	More than 100	
[0_15% [	10.00	10.00	0.00	30.00	50.00
[15_25% [	0.00	0.00	10.00	10.00	20.00
[25_50% [	0.00	0.00	10.00	20.00	30.00
Total	1	1	2	6	10
	10.00	10.00	20.00	60.00	100.00

$$\chi^2 = 4, 22$$

$$DDL = 6$$

$$P = 0,0476$$

This general compliance on NIs programs include compliance with six items: responsibilities and authorities on NIs programs, functionality of Infection Control Committees, key personnel responsible for fight against NIs, Training programs on the fight against NIs, Study of infection outbreaks and surveillance of NIs.

Infection Control Programs: Responsibilities and Authorities

Forty percent of health facilities had less than 15% compliance levels with recommended practices on responsibilities and authorities, thirty percent a compliance level range between] 15-25%] , twenty percent between] 25-50%] and ten percent more than 50% compliance level. There is a significant relation between compliance with responsibilities and authorities and health facility capacity according to Fisher test. (Table 4)

The responsibilities and authorities of individuals involved in the NIs control program of the health facilities surveyed were not generally know. Twenty (20)% of the health facilities presented a document outlining these responsibilities. For the other health facilities, the description was verbal and vague. For 90% of health facilities, the exact roles of both team members were not specified. In one of the health facilities, this role was assigned to all staff. For health facilities with written documentation detailing these responsibilities, they were not available as part of daily practice or posted on clinical unit walls.

Review of some practices such as maintenance of facilities, waste disposal, cleaning services, by infection control programs was frequent (80% of health facilities) while practices such as hygienic preparation of food, hygienic preparation of enteral feeding, sterilization or disinfection of equipment, air quality, sewage disposal systems, the quality of drinking water and the handling and disposal of corpses or body parts were

less reviewed. As regards the ability of programs managers to undertake actions, in 50% of the health facilities surveyed, the demand for the production of cultures or other laboratory tests, the request to perform isolation measures for a patient or the closure of a room are actions that the program or services in question were authorized to do. Reviewing and examination of patient records were not part of the actions that program officials were empowered to undertake. Thirty (30) % of health facilities admitted to receive financial support for training programs. No financial support was available for laboratory services and follow-up.

Functionality of Infection Control Committees

Fifty percent of health facilities had less than 15% compliance levels with recommended practices on functionality of Infection Control Committees, ten percent a compliance level range between] 15-25%] , thirty percent between] 25-50%] and ten percent more than 50% compliance level. There is a significant relation between compliance with functionality of infection control committees and health facility capacity according to Fisher test. (Table 4)

The functionality of the Infection Control Committees is one of the recommendations of this module followed by a single health facility. Seventy (70) % of health facilities had a team in charge of the fight against NIs. The team's names vary according to the structures: hygiene committee (30%), hygiene and safety committee (10%), hygiene and safety department (10%), hygiene and safety unit (10%), committee for the fight against NIs (10%). Some of these include both a hygiene department and a control committee (30%). All of these teams include at least one physician, nurse and other trained person. In the last 12 months prior to the study, 20% of health facilities held meetings. 80% did not and therefore did not discuss topics such as infection rates, specific cases of infection, outbreaks of infection, sterilization or disinfection procedures, isolation measures and safeguards, employee health or education and training programs. Some of these topics were discussed at health facility general meetings (infections focal spots, employee health and education and training programs). Topics on antibiotic use and control and antibiotic resistance were not addressed in any of these facilities.

Key personnel responsible for fight against NIs

Thirty percent of health facilities had less than 15% compliance levels with recommended practices on key personnel responsible for fight against NIs, forty percent a compliance level range between] 15-25%], twenty percent between] 25-50%] and ten percent more than 50% compliance level. There is a significant relation between compliance with recommendation on key personnel responsible for fight against NIs and health facility capacity according to Fisher test. (Table 4)

The key personnel responsible for fight against NIs were mostly physicians biologist (40% of health facilities), chief of nursing services (30%), public health specialists (10%), and hygiene engineering technicians (20%). The training of key personnel in the fight against NIs was not specialized training in the fight against nosocomial infections or this was less than 6 for those who were trained. Half of these staff admitted spending a little time each week on activities to fight against NIs. In the other health facilities, they were interrupted by the discontinuation of the committee's activities. Nursing personnel responsible of NIs control when not in charge of the program had received training of less than 6 months for 20% of the health facilities and others had received no specialized training for the NIs control. None of these staff admitted having spent the majority of their time on activities to fight against NIs.

Training programs on the fight against NIs

For this item, twenty percent of health facilities had less than 15% compliance levels with recommended practices on training programs on the fight against NIs, twenty percent a compliance level range between] 15-25%], thirty percent between] 25-50%] and thirty percent more than 50% compliance level. There is also

a significant relation between compliance with recommendation on training programs on the fight against NIs and health facility capacity according to Fisher test. (Table 4)

One of the health facilities surveyed had an orientation program that included information on infection control for nurses and other patient care staff within the hospital, but the physicians were not required to follow it. Ninety (90)% of health facilities did not submit an orientation program. On the other hand, all of the facilities surveyed have regular continuing training programs for their staff in which physicians were required to participate. Fifty (50) % of health facilities did not discuss about NIs in their continuing training in the past 12 months. The most commonly discussed topics in these health facilities during continuing training were: hand hygiene, prevention of communicable infections, post-surgical care. Topics on urinary catheter infection prevention and antibiotic resistance were not discussed.

Study of infection outbreaks and surveillance of NIs

For this item, all the health facilities had less than 15% compliance level. (Table 4)

All the health facilities had a score below 15%, meaning that training and follow-up on recommended practices are required. 30% of health facilities had studied outbreaks of infection in the past 12 months. This was not a systematic surveillance but an investigation on the demand of services which had an increase rate of certain bacteria. Surface samples were taken in 20% of the health facilities, followed by disinfection of the area incriminated. One of the cases reported by the head nurse of a service was the increase of blood infections in a neonatology ward. A report was made after disinfection and sent to the management of the health facility concerned. No data collection is conducted for other types of infections (nosocomial pneumonia, urinary nosocomial infections, surgical site or wound infections, episiotomy infections, postpartum endometritis, nosocomial meningitis, nosocomial skin infections, gastroenteritis nosocomial neonatal *conjunctivitis*, including newborn), neither rate calculation nor relationship to services or personal care.

Table 4: Summarizing compliance with recommended practices on different evaluation criteria of fight against NIs programs per health facility capacity (number of beds)

Evaluation criteria		Percentage	Total number of beds of health facility				
			1 - 25 beds	26 - 50 beds	76 – 100 beds	More than 100	TOTAL
Responsibilities and authorities	[0_15[		10.00	10.00	0.00	20.00	40.00
	[15_25%[		0.00	0.00	10.00	20.00	30.00
	[25_50%[		0.00	0.00	10.00	10.00	20.00
	>=50%		0.00	0.00	0.00	10.00	10.00
	Total		1	1	2	6	10
				10.00	10.00	20.00	60.00	100.00
		$\chi^2 = 5, 55$	DDL= 9		P= 0,0286		
functionality of Infection Control Committees	[0_15[		10.00	10.00	0.00	30.00	50.00
	[15_25%[		0.00	0.00	0.00	10.00	10.00
	[25_50%[		0.00	0.00	10.00	20.00	30.00
	>=50%		0.00	0.00	10.00	0.00	10.00
	Total		1	1	2	6	10
				10.00	10.00	20.00	60.00
		$\chi^2 = 7, 55$	DDL= 9		P= 0,0238		
Key personnel responsible for fight against NIs	[0_15[		10.00	10.00	0.00	10.00	30.00
	[15_25%[		0.00	0.00	10.00	30.00	40.00
	[25_50%[		0.00	0.00	0.00	20.00	20.00
	>=50%		0.00	0.00	10.00	0.00	10.00
	Total		1	1	2	6	10
				10.00	10.00	20.00	60.00
		$\chi^2 = 10, 55$	DDL= 9		P= 0,0095		
Training programs on the fight against NIs	[0_15[		10.00	0.00	0.00	10.00	20.00
	[15_25[		0.00	0.00	10.00	10.00	20.00
	[25_50%[		0.00	0.00	0.00	30.00	30.00
	>=50%		0.00	10.00	10.00	10.00	30.00
	Total		1	1	2	6	10
				10.00	10.00	20.00	60.00
		$\chi^2 = 9, 72$	DDL= 9		P= 0,0095		
Study of infection outbreaks and surveillance of NIs	[0_15[		10.00	10.00	20.00	60.00	100.00
	Total		1	1	2	6	10
			10.00	10.00	20.00	60.00	100.00

Interpretation and Discussion

This assessment was conducted at 10 health facilities of Yaounde city to determine compliance to recommended practices on NIs. The health facilities of 1st category were the most represented. This is explained by the technical equipment available in these health facilities. The ministry of public health (Cameroon) has defined the technical equipment corresponding to each structure category. To achieve the objectives set out, the health facility selection criteria were more appropriate for hospitals in this category. This observation was the same in a study carried out in a Brazilian city to evaluate 13 NIs Control programs in health services were 69.23% fell into category of general hospital, 53.84% were private hospitals with more than 70 beds. (Meneguetti, 2015)

Health The assessment tool used was developed based on WHO recommendations on the prevention of NIs (OMS, 2008). These recommendations stipulate that public and private health training should meet quality standards. WHO recognizes that older buildings and buildings in developing countries would not be able to meet these standards. However, the principles directing them must be kept in mind during local planning and during modifications or renovations. These indicators used for the study show that these recommendations are generally followed in the health facilities concerned. The systematic presence of sick guards in adult rooms, although difficult to reduce in the African context, represents a potential source of dissemination of nosocomial bacteria.

Most health facilities used water from public systems. The physical, chemical and bacteriological properties of water used in health care facilities must meet local standards. The facility is responsible for water quality from the time it arrives in the building. For some applications, water from the public distribution system must be treated by physical or chemical means for medical use. In fact, two studies carried out in Switzerland in public and private hospital formations show the interest of the targeted use of apyrogenic end filters that eradicated the presence of *Legionella spp.*, *Pseudomonas aeruginosa*, *Acinetobacter spp.* and other germs that existed in untreated water and represented a major risk in oncology services, wound treatment units, endoscopes reprocessing and intensive care. (Burr, 2011) (Marchal, 2011). Another study carried out in Senegal on public water supply network has raised awareness on the presence of coliforms and a high rate of limestone with pH modification facilitating the presence of biofilm and the degradation of sterilization (Ndiouck, 2011). One of the health facility surveyed used chlorinated rain water. According to the WHO guide, water can also be disinfected and made drinkable by adding a small amount of bleach solution (sodium hypochlorite solution). Chlorination with bleach should be done just prior to storage of the water in a container. This should preferably be a narrow-neck container, due to the frequent risk of contamination with larger collars in which a hand or utensils can be passed. Bdom and al (2011) in their work on patient safety in the Manieva and South Kivu provinces in DRC reported on 10 structures and observed a complete absence of running water supply in these health facilities unlike those of the present study.

The national directives on the control of NIs are poorly known and generally not adopted or applied throughout the health facilities surveyed. At the central level, responsibility and decision-making authorities to ensure the availability and use of infection prevention and control policies and guidelines usually work with the Ministry of Health. A Regional or Provincial Health Board should be responsible for monitoring the facilities under its responsibility in terms of use and compliance with infection prevention and control. It is also the responsibility of the Council to ensure that adequate and appropriate infection prevention and control resources are available in these facilities (WHO/AFRO and al. 2001).

The authorities and responsibilities of the NIs committees in the facilities of our study are unclear and unknown to the hospital staff and sometimes to the members of these committees. An evaluative study carried out at the maternity hospital of Porto Novo in Benin from 2009 to 2011 made it possible to compare before and after the evolution of per-partum infections and the attitudes and practices of healthcare providers (out of 9 care procedures). Per-partum infection decreased from 5.7% to 1.0% (P0.01). Overall, the technical

gestures of the care procedures improved very significantly after the interventions; these were those of simple and surgical hand washing, observances of good practices in the expulsion of the baby, care of the perineum after childbirth, uterine revision, care of newborns, home sounding, repair of episiotomy, the artificial fracture of the membranes. This study confirms that the promotion of infection control and control programs, based on simple and acceptable interventions, is yielding positive results (Saizonou, 2013).

Documentation on the appointment and duties of the members of these committees were only available in 3 health facilities. The administration or medical management of health facilities must be actively involved in supporting the infection control program and ensure that the Infection Control Team has the authority to facilitate infection control. Adequate operation of the program, establish a multidisciplinary committee to fight nosocomial infections, and identify the resources needed for the program to be able to monitor nosocomial infections and apply the most appropriate prevention methods (WHO, 2002).

NIs Control Committees are non-functional in the majority of the health facilities surveyed, although their constitution is consistent with the recommendations. The hospital Nosocomial Infection Control Committee should include a core group that carries out daily infection control activities (WHO, 2002). Ministry of public health decision N°178 in Cameroon establishing a hospital hygiene unit in public health facilities establishes these units, particularly within General Hospitals, Central Hospitals, Regions and districts hospitals. Under the authority of the health facility lead, this unit is responsible for the implementation of NIs prevention and control measures and the promotion of environmental health in health facilities. The missions and composition of these units are clearly defined. Several African countries have put in place national strategies to fight against NIs (Ministry of Public Health, 2006). Niger's strategy from 2016 to 2020 focuses on capacity building, coordination and research to ensure the quality and effectiveness of the fight against nosocomial infections (Niger Ministry of Public Health, 2016). This lack of functionality is reflected by the absence of meetings during the last 12 months in 80% of health facilities. It is recommended that the Nosocomial Infection Control Committee meet at a specified time and place monthly or quarterly. In his graduate thesis in management of health organizations, Dr Hamid ZERROUK evaluates the implementation of the fight against NIs at the "Centre Hospitalier Régional El Idrissi" of KENITRA in Rabat, Morocco. He noted a discrepancy in the degree of implementation of the fight against NI's activities, which could be justified by contextual factors that would have negatively influenced the implementation of the activities. They are represented by the lack of adherence of members of the committee to fight against NIs and hospital professionals to its activities and the failure of mechanisms that promote good communication between the fight against NIs committee members and hospital professionals (ZERROUK, 2013). These factors could also justify the lack of functioning of the committees assessed during our study. This was not similar to the study made in a Brazilian city (Meneguetti, 2015) when analyzing the indicator "evaluation of technical and operational structure of NIs Control Programs" the average compliance of institutions was 75 %. We notice in this case that the study was conducted on functioning infection control programs and some of the health facilities surveyed were even accredited (30%).

The lack of specific training of key personnel involved in the fight against NIs and specific training programs on the fight against NIs could be another cause of non-functioning. The duties of the Infection Prevention and Control Officer are primarily associated with infection prevention and control practices. It should be a health care professional with advanced training in infection prevention and control and who is responsible for day-to-day infection prevention and control activities (WHO/AFRO and al., 2001). The infection control professional is usually a state-educated nurse, often with a graduate degree. Some are medical technicians and others may have master's degrees in epidemiology or related fields. These professionals are often trained in infection surveillance and control and epidemiology through basic training provided by professional bodies or health institutions. In the evaluation of NIs control programs made by Meneguetti and al (2015) in Brazil, it was noteworthy that all professionals surveyed reported that they did not received specific training to operate in the service or had expertise in the area. Specifically, 57% of

nurses did not have prior experience and expertise in the area, while all members of the medical team reported they had performed medical residency in infectious disease.

Ndiaye (2011) in his study on the evaluation of patient safety in a National University Teaching Hospital (CNHU) of Senegal gives an overview in which he also notes the lack of functionality of the fight against NIs committee of this structure, lack of a structure to coordinate security and lack of validated protocols with periodic evaluation (Ndiaye, 2011). Another review of the situation of NIs carried out in Burkina Faso by Zidi et al (2011) highlights the creation of health services in all hospitals and the existence of trained staff, but nevertheless notes resistance to change. The Infection Prevention and Control Committee should plan and lead ongoing training programs to ensure that all staff is aware of infection transmission prevention measures (WHO/AFRO and al., 2001). Mbim (2016) in its review of NIs in sub-Saharan Africa notes that a simple but effective control program coupled with effective training of health personnel are sustainable actions that can reduce the endemic nature of NIs in Sub-Saharan Africa.

The study of infection outbreaks is not done in all health facilities in our study despite periodic reports and disinfection actions. One of the responsibilities of the Nosocomial Infection Prevention and Control Committee is to study the spread of infection outbreaks in collaboration with medical, nursing and other personnel. General experience has shown that NIs outbreaks are extremely common in hospitals with limited resources. If no outbreaks have been detected, monitoring and screening procedures should be reviewed (WHO/AFRO and al., 2001).

The development of a monitoring process for this rate is the prerequisite for identifying local problems and priorities and for evaluating the effectiveness of infection control activities. Where resources are limited, the use of surveillance as an infection tracking tool should generally be limited to the study of outbreaks or exposures. When considering other types of monitoring activities, objectives should be reasonable in terms of resources and time available, and the intended use of the data should be clearly defined before the systematic collection of data is implemented (Tietjen et al., 2003). Data collection requires multiple sources of information as no single method is sensitive enough to ensure data quality. Case detection techniques include room activities and observations, laboratory reports, other diagnostic tests, and case discussions with health care staff during periodic room visits (WHO, 2002).

The indicator “evaluation of epidemiological surveillance system of NI” had an average compliance of 82% for the study made in Brazil, showing that functioning committees can make good surveillance results (Meneguetti, 2015)

Conclusion

The programs and strategies for fighting against NIs were evaluated in 10 health facilities of Yaounde city through this study. Good adherence to recommendations with scores above 75% is noted for the characteristics of these health facilities rooms, water supply and demographics characteristics. On the other hand, these health facilities need training and follow-up (score under 50%) in terms of responsibilities and authorities in the NIs control programs, NIs control committees, activities and training of key personnel, training programs on NIs and Study of infection outbreaks and surveillance of NIs. The compliance average of health facilities were significantly related to the capacity of this health services. Awareness and promotion actions are required to understand and adopt recommendations on NIs monitoring. An infection control program is the basic organization structure to fight against NIs. The implementation of these recommendations can not be effective without a good diffusion and monitoring of national guidelines. This research identified that the evaluation of NIs programs are feasible in Yaounde and can be used both by hospitals programs and the national units that carry out the inspection in health institutions as a tool to improve the activities carried.

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References

- [1] Bdom, S., & al. (2011). The issue of patient safety in the provinces of Maniema and South Kivu in Democratic Republic of Congo. Zurich.
- [2] Burr, M. (2011). L'utilisation ciblée de filtres terminaux apyrogènes pour la prévention des infections nosocomiales liées à l'eau dans un hôpital public. *Conférence internationales sur les infections nosocomiales* , 44.
- [3] Dao, A. (2017). Revue documentaire sur les infections hospitalières en Afrqie de l'Ouest.
- [4] Godreuil, S. (2007). Infections nosocomiales et bactéries multirésistantes. *Mb bactériologie* .
- [5] Marchal, V. (2011). L'utilisation ciblée de filtres terminaux apyrogenes pour la prevention des infections nosocomiales liees a l'eau dans une clinique privée. *International conference on prevention and infection control* , 40.
- [6] Marya Gonçalves Meneguel, A. (2015). Evaluation of nosocomial infection control programs in health services. *Rev latino-am. Enfermagem* , 98-105.
- [7] Mbim, E. A. (2016). A review of nosocomial infections in Sub-Saharan Africa.
- [8] Meneguetti, a. A. (2015). Evaluation of nosocomial infection control programs in health services. *Rev latino-am. Enfermagem* , 98-105.
- [9] Ministère de la santé publique. (2006). *Décision n°0178/d/msp/sesp/sg/dps/sdha/sons sanitaireshm/bphe portant creation d'une unite d'hygiene hospitaliere dans les formations sanitaires publiques.*
- [10] Ministère de la santé publique. (2017). Guide de Bonnes Pratiques d'hygiène en milieu hospitalier. Yaoundé.
- [11] Ministère de la santé publique niger. (2016). *Stratégie nationale de lutte contre les infections nosocomiales au niger 2016 -2020.*
- [12] Ndiaye, t. (2011). *Evaluation de la sécurité des patients dans uncentre national hospitalo-universitaire (cnhu) dusénégal.*
- [13] Ndiouck, a. (2011). Processus de dégradation de l'eau potable dans un établissement de santé au sénégal. *International conference on prevention and infection control* , 41.
- [14] Njall c et al. (2013). Ecologie bactérienne de l'infection nosocomiales au service de réanimation de l'hôpital laquintinie de douala, cameroun. *Panafrican medical journal* , 14:140.
- [15] OMS. (2008). *Prevention des infections nosocomiales-guide pratique 2 ème édition.*
- [16] Saizonou, e. A. (2013). Evaluation des attitudes et pratiques professionnelles pour la prévention des infections à la maternité de l'hôpital de porto-novo au bénin. *Journal international de santé au travail volume 1* , 12-23.
- [17] Zerrouk, d. H. (2013). *Evaluation de l'implantation du comité de lutte contre lesinfections nosocomiales au niveau du centre hospitalier régional el idrissi de kenitra.* Rabat.
- [18] Zida, & al, e. (2011). *Etat des lieux de la situation des infections nosocomiales au burkina faso.*