- Independent variables: technological environment (air, water, instruments, movables, floor, wall, information system used in the theater…), operating room organization (structure indicators, ratio of structural indicators, planifications, programmations, evaluations, registrations retroactions…), prevention of infections

7- Data analysis

Quantitative data were collected and analyzed with Microsoft office word and excel version 2010. The results are presented in figures, percentages, tables and graphs.

8- Limits of the study

A number of non-participation of the personnel of the units, insufficient relevant information about the organization of the operating theater and the limitation of the study to just 3 hospitals of the three regions of the grand-north.

RESULTS

I- Architecture of the operating room theater

a- Concept of the room theater

Table1: concept of the operating room theaters of the RHG, RHG, RHM

		Ngaoundéré	Garoua	Maroua
Lock Function	Changing room/Cloakroom	NO	NO	NO
	Chief Nurse office	01	02	02
Stockagefunction	Stockingpremises	01	02	01
Operating function	Preoperativeprepartion room	NO	NO	NO
	Pre-ansthetic room	NO	NO	NO
	Scrub room	YES	YES	NO

Wakingfunction	Recovery room	NO	YES	YES
Sterilizationfunction	Disinfection room	YES	YES	YES
	sterilization	YES	YES	YES
Others	Computing network	NO	NO	NO
	Anatomopathology	NO	NO	NO
	Video	NO	NO	NO

We notice clearly from the above table that, the cloakroom, the preoperative preparation room, the pre anesthetic room, a computing network system, the anatomy pathologic room and videos for monitoring were not provided in the three operating rooms of the hospitals. We can as well notice on the other hand the presence of a scrub room in the RHN and RHG whereas in the RHM as well as those of Garoua and Ngaoundéré, we ascertain the presence of the office of the chief nurse and that of the anesthesiologist, reanimation and waking room, sterilization and disinfection room in the three operating rooms.

b- Architectural elements

Table2: system of air treatment

	Ventilation	Diffusion	Filtration	Suppression
Ngaoundéré	NO	NO	NO	NO
Garoua	NO	NO	NO	NO
Maroua	NO	NO	NO	NO

This table shows the absence of a system of air treatment in the three operating roomseven though some of the operating rooms are equipped with working or no air conditioning.

II- Operating room theater equipment's

a- Technical equipment's

Table3: technical equipment's of the RHN, RHG and RHM

		Ngaoundéré	Garoua	Maroua
Environmentallighthning	Natural lightning and electricity	YES	YES	YES
Medicalfluids	Oxygendioxide (O_2)	YES	YES	YES
	Air	YES	YES	YES
	Dinitrogen oxide (N_2O)	YES	YES	YES
	Nitrogen (N_2)	NO	NO	NO
	Void	NO	NO	NO
Negatoscope	Negatoscope	NO	NO	YES

This table shows that the three theaters are enlightened but the absence of nitrogen gas among medical fluids and the dysfunction of the negatoscope (film illuminator) noticed in the room theaters of Ngaoundéré and Garoua.

Table4: mobile medical technology

		Ngaoundéré	Garoua	Maroua
Electric knife	Electric knife	YES	YES	YES
Anestheticequipments	ECG	NO	NO	NO
	Cardiac and respiratorymonitor	NO	NO	NO
	Anesthesiologic post of service	YES	YES	YES

Radiographicequipments	Brillancy amplifier	NO	NO	NO
Otherequipments	Defibrillator	NO	NO	NO
	Endoscopic instruments	NO	NO	NO
	Laser	NO	NO	NO
	Operation microscope	NO	NO	NO
	Echographer	NO	NO	NO

The table above shows that the operation lamp differs in the three rooms whereas, the anesthesia pendant and the surgical pendant do not exist in the structures.

III- Description of the organization of the operating room

Table5: surgical process illustration

	Ngaoundéré	Garoua	Maroua
Surgical request file completed by the physician	YES	YES	YES
Attribution of a date for surgery scheduled	YES	YES	YES
Realization of biological tests	YES	YES	YES
Preoperativecounselling	NO	NO	NO
Biological test validations	YES	YES	YES
Conception of the surgical due date program with time attributions	YES	YES	YES
Attribution of hospitalizationbeds	YES	YES	YES
Surgicalprocedure	YES	YES	YES

Here, the process is respected by all the personnel intervening in the system with the exception of preoperative managements not really observed in the three operating room.

IV- Hygiene and asepsis of the operating room

Table6: Use of barriers of protection

	Tools/Items	Ngaoundéré	Garoua	Maroua
Dressing	Charlott	YES	YES	YES
	Safety glasses	NO	NO	NO
	Surgical mask	YES	YES	YES
	Rubber boots or sabots	YES	YES	YES
	Uniform change before entrance	YES	YES	YES
Hand washing	Simple hand washing	Not always	Not always	Not always
	Surgical scrub	YES	YES	YES
Antisepticsused	Iodised polyvidone	YES/NO	YES	YES
	Foaming soap	YES	YES	YES
	Others(dermobacter, till, etc.)	YES	YES	YES
Time accorded to hand washing	Lessthan 1 minute	NO	NO	NO
	1 to 2 minutes	NO	NO	YES
	3 to 4 minutes	YES	YES	NO
	5 to 6 minutes	NO	NO	NO

Among the 4 surgical procedures we have observed, all the staff of the hospitals used barriers of protection but they don't use safety glasses. Simple hand washing was not always practiced, and the antisepsis at the entry of the room was made by polyvidon iodine and soap. Important to note also is the time of hand washing that never passed 5 to 6 min.

DISCUSSION

This design study concerned the technological environment and the organization of the operating room of the regional hospitals of Ngaoundéré, Garoua and Maroua whereas the studies carried out by Gille in 2007 and the MeaH in 2006 were based mainly on the organization of the operating room. The room theaters concerned in this study, thought, they respect certain norms, are declared antiquated and hence do not facilitate the good functioning of the room theaters. On the other hand, there exist no recovery room in the theaters of Ngaoundéré and Garoua with one intensive care unit for four operating rooms. Besides, in Maroua, there exist two intensive care units but we notice the absence of a surgical scrub room in the theater.

I- Technological Environment

The quality of air in the operating room is an essential element to be taken into consideration since the principles must be respected scrupulously in the fight against nosocomial infections by hindering the introduction and stagnation of particles that may potentially infect the surgical site incision. The French norm AFNOR NF S90 351 of June 2003 presents architectural elements not in favor of a rigorous treatment of the quality of air in the room theater. The observation on the field made shows that the air conditioner in certain operating rooms were not working, as such, the air environment of the room theater is quite a worrying subject. Whereas, it is indispensable to have an overpressure in the rooms so that exterior contaminated air doesn't cross the entrance airlocks and this overpressure going decreasingly from the operating room to the entrance gateway (Harbarth.S, 2005). This management situation of aero bio-contamination in the three theaters may be as a result of the ageing antiquated buildings and the non-inclusion of certain facilities during the conception of these room theaters.

II- Room theaters organization

a- Functioning model of the room theater

The RHN and the RHM works both following the historical and regulated models. Studies carried out in six hospitals of Ajaccio showed that, these hospitals functions following the scheduled and regulated model (MeaH. 2006). The surgical program is a simple extension of the notebook of rendezvous' of practitioners and organized as such: planifications, programmations, supervision, recordings even though there is no retroaction.

At the RHG, the room theaters function following the regulated model. A study carried out in the hospital of Avicenne shows that the hospital equally functions following the regulated model (Gille. 2007). These theaters are organized following the process: planifications, programmations, supervision, recordings, retroactions is not still practiced.

b- Infection prevention practice

In this study, none of the personnel wore safety glasses but used the other protection barriers commonly known and changed regularly their uniforms before entering the theater. In this study, Cheikh T. et al.; in 2010 in Senegal didn't treat this topic. For Lannelongue J, in a study in France, reveals that at the entrance of the theater, all the civilian clothes with shoes must be removed and a clean theater uniform put on. The insufficient deliverance of consumable items in our room theaters in Africa may explain the difficulties faced with the regular change of uniforms with movements of in and out of the theater within a day. In the course of this study, we noticed that certain personnel didn't practice simple hand washing before getting into the theater. The transmission of germs in the hospital is for the most concerned by healthcare workers: according to Brucker G, 20 to 40% of nosocomial infections are caused by hand transmission from one patient to the other; hand washing must be practiced each time a care is done and this respecting the recommended standards from one patient to the other as affirms Lannelongue J in his study. Surgical scrub in this study was practiced using a foaming antiseptic and traditional foaming soap, nevertheless, the foaming antiseptic is generally unavailable. Cheikh T. et al.; in Senegal equally reveals the insufficiency of consumable items in the hospitals of Senegal in the room theaters.

Ennigrou S. et al.; in Tunisia showed in a design study that 75% of nosocomial infections may be avoided by the observation of simple hand washing practice and principles. Didier P. in France, in a study affirms that the time for scrub is equally an important factor of prevention not only because of the mechanical actions but equally to obtain a sufficient time-contact for the product to act optimally.

CONCLUSION

At the end of our analyses, we notice that the three operating rooms got a technological environment and an organization of the theater that do not reflect their level as regards to the sanitation chart of Cameroon. These obsolete and antiquated environmental technologies does not facilitate work to the practitioners and must of all limit them in their care management of certain pathologies. The organization we have observed in these theaters is just the consequence of a poor technological environment that makes it in such a way that qualified personnel find no interest to stay, work becomes difficult both for medics and paramedics, creating as such pseudo-room theaters. This study permitted us to confirm the inconsideration of the room theaters as the first unit of all hospital departments.

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