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Impact of the Information Systems in certain services of medical imagery of Cameroun : case of General Hospital of douala and Yaounde, regional hospital of Garoua, Cameroon

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Abstract

Objectives *:* The medical imaging is one of the specialities of the medicine which the most profited from computerization these last decades through the installation of the system from filing and of communication of the medical images (IF) which starts to become an option impossible to circumvent.This system allows a medical step in which the professional of medical imaging joins together in a virtual form all the relevant data for a holistic and effective approach of the customer.The study consisted in arising the importance of the establishment of and the filing communication system of images within certain medical establishments and its influence on the medical practices.

Method *:* For that, one six months duration, a descriptive cross-sectional study was undertaken in the services of imaging of the General Hospital of Douala and Yaounde and of the Regional Hospital of Garoua, functioning already with these systems of computerization. The data were collected using a preestablished standard questionnaire, then filled by the professionals of health of the services of medical imaging of thats sanitary structures.

Results: Engineers in imagery (55%) whose age bracket varied between 19-28 years were in a majority and 60% of the professionals had never received a training in information system.75% of use of the information systems were based on the visualization of the images taking into account its facility of use. 60% of the radiologists users of the Information systems found them beneficial for their services.34,6% of the systems were equipped in majority with the application *"management with the patient file"*. The speed of use of the functions *"visualization of the images"* was better in 70% of case.

Conclusion: Have regard to the problems raised by the innovation in this field in medical imaging as for accessibility, the speed of execution of the tasks and the interpersonal and interprofessional communication, we note the unanimity of these professionals on the positive impact which the Information systems exploit the productivity and the good management of the services of medical imaging.

Key words: Information system, Services of imaging, hospitals of Cameroun.

I- INTRODUCTION

The information system (IF) is an organized whole of the resources which make it possible to collect, store, process and distribute data [1]. In the field of the medical imagery, this information system consists of a system sociotechnic made up of two subsystems, one social and the other technique. The social subsystem is composed of the organisational structure and the personnel related to IF. The technical subsystem is composed of technologies , software and equipment of telecommunication and of the processes concerned with IF [2].This technical subsystem is also divided into 2 subsystems with knowing:

The information system of radiology or SIR, commonly called LAUGH (Radiology Information System) is a data-processing tool allowing the management of the patients in the

service of imagery of a structure [7].It is also the information system main part of a service of imagery.This central position is at the same time organisational and functional bus makes it possible to improve the organization, the effectiveness and the operation of the various units of the service, and consequently to guarantee the better traceability of the examinations carried out, as well as best dealt with of the patients [4].

The system PACS (Picture Archiving and Communication System) which deals with the electronic management of the medical images with functions of filing and communication.It thus facilitates the transmission of these images, via the data-processing networks, between various tools of exploitation such as software of image processing, or reprographes for impression of radiological films.The PACS "makes safe" the images carried out, it comes in complement from the patient file, because it communicates and associates the images the reports of the examination which the radiologist [4] writes. These information systems (RIS/PACS) answer several stakes in particular:To improve the diagnosis, to improve the co-operation between professionals of health, to better control the expenditure of health [2]…

Indeed, the use of films in imagery had remained until recently the single support of information, it was used for recording the image, exploiting it, storing it and transmitting it.The advent of digitalization allowed the optimization of these various functions, and for the quality of the image it is necessary to add the possibility of treatment.Moreover, this numerical imagery allows several applications in particular:contribute to the diagnosis, imagery 3d, the easy transfer of image for the diagnosis and the recording.

The very abundant work associated the many difficulties in the management of the data of the patient in the services of imagery due to the absence of an information system in some of these medical formations justified this study. And yet, the introduction of these information systems the PACS and LAUGH in medical imagery, although enough recent in our medium, brings to wonder about the current state of these systems in Cameroun.Indeed, these tools are judicious to play a paramount role in the PEC and the follow-up of certain diseases by allowing acquisition, the interpretation and/or the consultation of the radiological images of multi methods on a workstation (display consoles) thus offering a better quality of image also the possibility of storing and of transmitting the images with the associated data of the patient:it is effective management and the exchange of the data of the patient in the service of imagery.

If that is recognized and maitrized under other skies, which is thus the current situation of these information systems in the services of imagery of the hospitals of references of Cameroun?

This work consisted of an organisational study of IF in the services; an identification of the contribution of IF to the performance of the services and in an assessement of the quality of the use of the social resources and resources technical, as well with an aim of improving the follow-up and the PEC of the patients by the conservation and the securisation of of information of the patients as for the best followed during the later examinations, and better working condition the data base of the professionals of health and thus of facilitating interpersonal and interprofessional collaboration.For that, we had with:

- To arise the organization of IF in the aforementioned services;
- To identify the contributive elements with the performance of IF of these services;
- To evaluate the quality of the use of social and technical resources.

II- MATERIEL AND METHODS

1. Type, tallies and period of study

The study was spread out over one six months period going from April to September 2016.It was about a cross-sectional study and descriptive which was undertaken in three hospitals, including two general hospitals of Yaounde and Douala, and the center of radiology and medical imagery of the regional hospital of Garoua, because these structures were equipped with a technical plate provided with **the information system of radiology or SIR**, commonly called LAUGH (Radiology Information System) and of **system PACS (Picture Archiving and Communication System).**

2. POPULATION OF The STUDY

- the population-target was made up people who use and handle these system SIR and PACS.
- sampling included/understood:

¬ The doctors radiologists;
¬ Manipulators in nuclear medicine;
¬ Manipulators in radiology;

2.1. Criterion of inclusion

- Were included, all the users (Radiologists and Technicians) of the information systems RIS/PACS and having agreed to take part in the study;

2.2.Criterion of noninclusion

- Was excluded, very user having refused to take part in the study

3-METHOD

1.Instruments of data acquisition

For our collection we needed the instruments hereafter:

- The questionnaire:

- with questions opened, half-open and closed, intended for the doctors radiologists, having allowed to collect information about:their experiments with systems PACS/RIS, their working conditions, the stakes of their service, principal the problems of their service, their perception of the teleradiology, finally the advantages and the constraints which could block the installation of system PACS/RIS on the level of the centers of imagery of the country.
- intended for the technicians informed us about:the use of the radiological information system, their quality in particular their facility of use and their speed, the satisfaction of the technicians on the use of the radiological information systems, their impact as well as the priority points of improvement on the systems.

- In addition to the questionnaire we needed a card of information and enlightened assent.
- Our data were treated using data-processing tool (computer and its components) thanks to the statistical software:Microsoft Excel and Word 2013®, Ear information version 12.0, Plus² Sphinx - Lexica-V5 Edition.

2-collected variables

The collected variables were relative a:

- the age,

- with the kinds,
- with the categories of the personnel,
- the use of the information systems,
- with the equipment,
- in the working conditions of the personnel,
- the quality of the information systems and
- with the constraints related to the installation of these systems in other areas.

3. Ethical considerations

Ethics committees of the various hospitals which gave their agreement to make a study.

4. Difficulties

The difficulties to which we faced during the study were:

- the dysfunction of certain apparatuses at the time of the period of study;
- Delay of the administrative procedures of certain hospitals.
- The unavailability of certain personnel rather increased the time of collection.
- The under-manpower of personnel in these services of Radiologies and Medical imagery.

Results

The personnel was unequally divided with a strong concentration in the towns of Yaounde (43,75%) and Douala (31,25%).

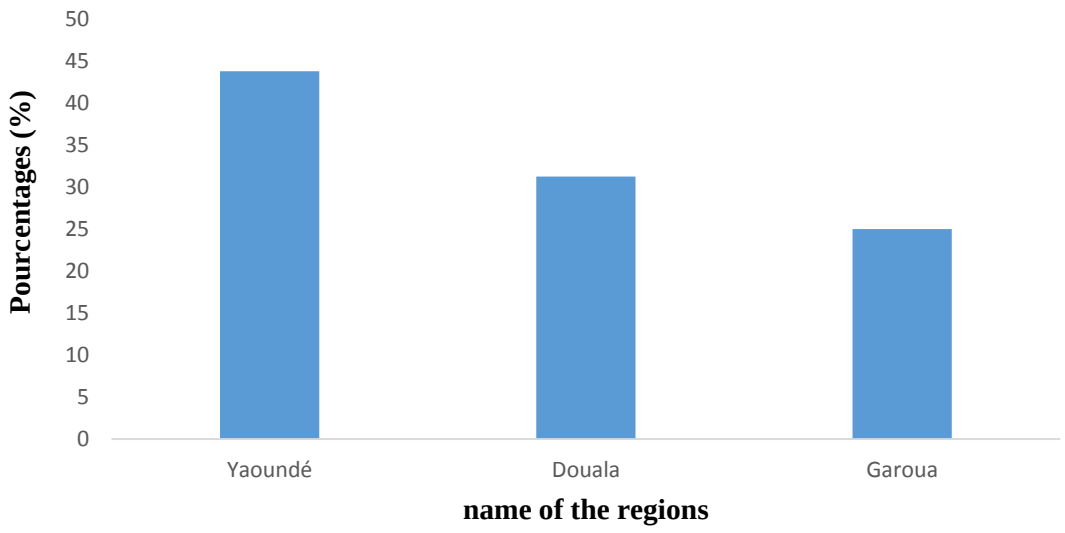

Figure 1:Total distribution of the sample according to the Areas

strong representation of the engineers (46,875%).These results present a light increase compared to those of Ekobena et al..(2015) which had obtained (35,7%) engineers.

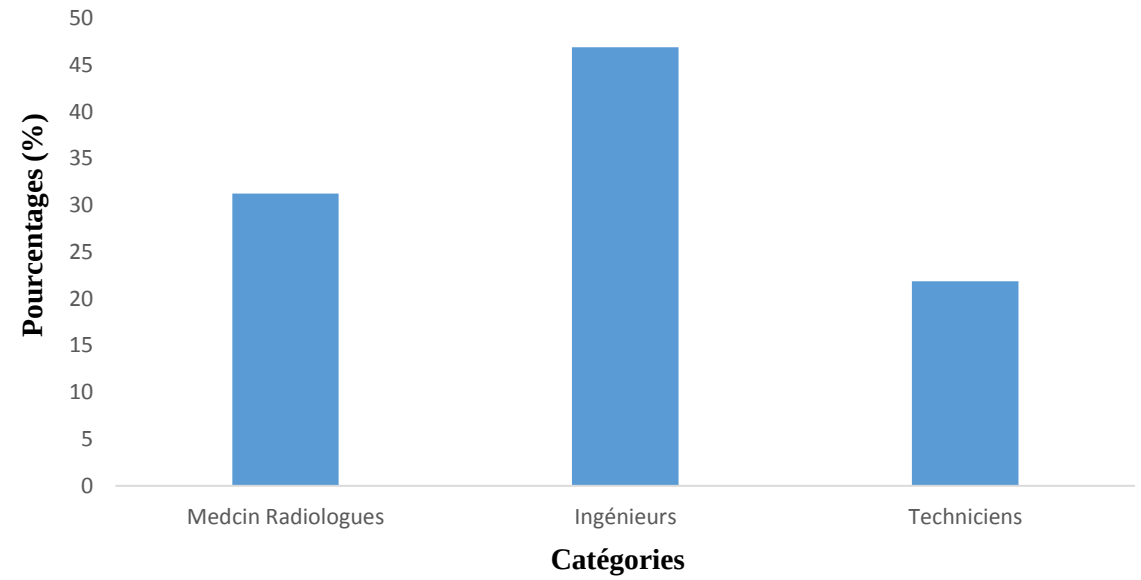

Figure 2: Distribution of the sample according to category

One of the principal stakes of the services of imagery was the improvement of the quality of service while increasing the productivity (50%).

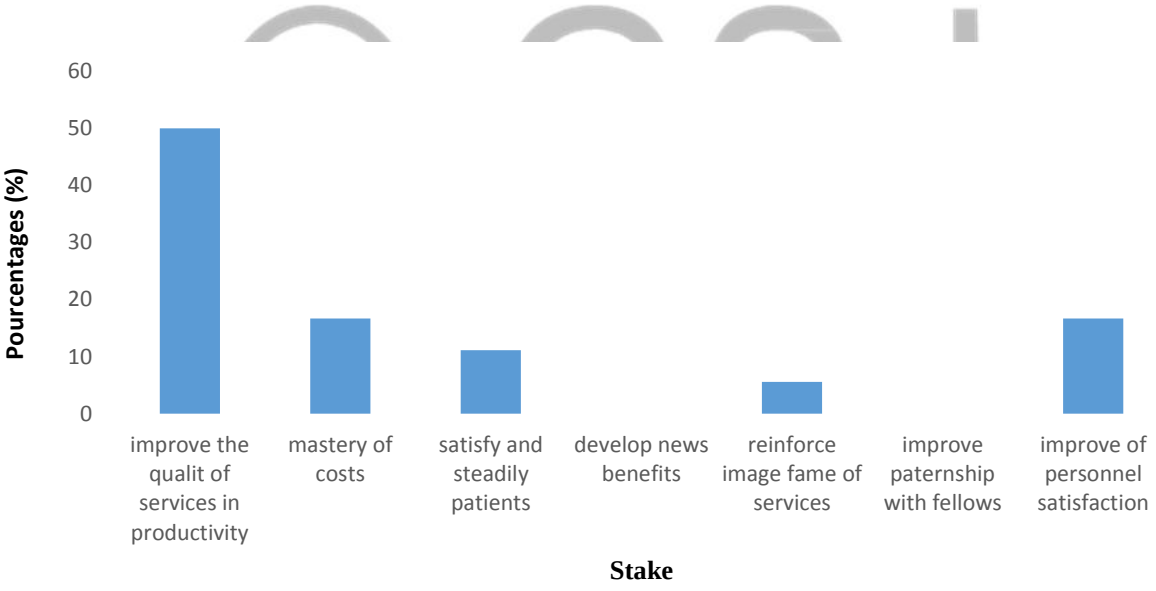

Figure 3: Stakes of the services

34,6% of the information systems were equipped in majority with the module ***"management with the patient file"***.

Tableau I : Equipment of IF RIS/PACS

RIS/PACS EQUIPMENT	Observations	Pourcentages %
Dashboard	6	23,1
Appointment	2	11,5
Save	1	15,4
Report	1	1,7
Management of patient dossier	9	34
Billing	0	0
Data transfer	1	3,9
Total	26	100

***PACS: Picture Archiving and Communication System*
RIS: Radiologic Information System

The constraints related to the establishment of system PACS/RIS on the level of the centers of imagery of Cameroun, rests primarily on the significant cost of the project (58%).

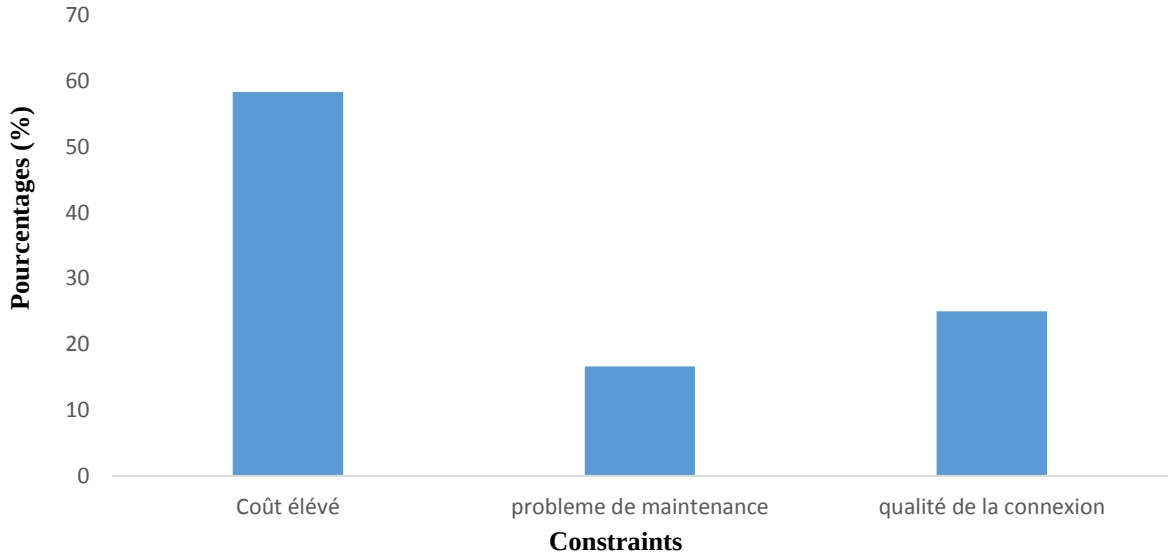

Figure 4, forced related to the implementation of system PACS/RIS in the centers of imagery of Cameroun

IV-DISCUSSION

Total distribution of the sample according to the Areas

Figure 1 presents to us the pattern of the settlement of study according to the areas.One notes a disproportional distribution of the personnel, more concentrated in the town of Yaounde (43,75%) follows of Douala with (31,25%) finally the town of Garoua is represented to 25%.These results are higher than those obtained by **Ekobena *et al.*. (2015)** which, had obtained a strong concentration of the personnel in the towns of Yaounde (28,60%) and

Douala (14,30%) with like criteria of exclusions at least a month of experiment.This difference could be explained by the sample size, the places of study and the criteria of participation.

Distribution of the sample according to category

Figure 2:our sample is divided into 3 sub-groups with knowing:the doctors Radiologists, engineers and technicians.One notes a strong representativeness of the engineers of about 46,875% follows Radiologues doctors (31,25%) and finally a weak representation of the technicians to a total value of 21,875%.

With. Questionnaire intended for the doctors radiologists

- The analysis shows us that 80% Radiologues doctors having taken part in our study are users of systems RIS/PACS. 20% represent those which used this system but for the period of our collection, these systems were in maintenance.
- According to the analysis of the level of experiment of the radiologists with system PACS, one notes that 60% of these radiologists have judged satisfying their experiment with system PACS.The latter are equipped in majority with the module "management with the patient file" with a frequency with 34,6% this prevalence with this module can be explained by the insufficiency of financial means consequently the hospital structures obtain the modules which are most frequently used and more solicited to answer the stakes of the structure.

Concerning the improvement of the working conditions with systems RIS/PACS on the level of the services of imagery the opinions are divided between the doctors radiologists.And we noted that the aspects of improvements related to the quality of the images provided which accounted for 33,3% beside this improvement of quality we noted a considerable saving of time with 25%. In more 80% of the doctors radiologists considered the images provided by system PACS of better qualities compared to traditional films and that reduces considerably the rejections and the repetitions of the incidences

This high percentage is explained by the fact why with system PACS via digitalization it y' has this possibility of image processing thing which was not possible with the traditional system.

- It during F Laborderie underlined in its article "For a pragmatic implementation of the information systems in radiology" that the installation of a PACS will usually bring the benefit allot to the information systems:the best availability of information;the best communication of medical information;improvement of the effectiveness [12].

- In 50% of case, the principal stake of a service of imagery in connection with the study was to improve the quality of service while increasing the productivity was reached.However 5,6% only think of reinforcing the notoriety of their establishments.
- These results are confirmed by a study undertaken by INTERACTIVE MARKETOR DEPARTMENT STUDIES in France in 2007 when 78% of the guarantors specified like stakes of their services an improvement of the quality of the services by increasing the productivity [16].
- More than 57% of various problems of the services of imagery which the problems reside at the level of the data and information management of the patients.
- The teleradiology is perceived by the doctors radiologists like a means of reducing displacements of patients and doctors (30% of the opinions) and also like a better

access to the medical care in the badly served areas (30%).On the other hand of other think that it is a risk for the quality of the diagnoses (20%).

- These results corroborates with those obtained by the department of ***INTERACTIVE studies MARKETOR*** in France in 2007 when 52% of the guarantors have perceived the teleradiology like a better access to the medical care in the badly been useful areas [16].
- The opinions of the doctors radiologists on system PACS/RIS, have were favorable 33,3% find this system beneficial;and has many advantages in their professional life considering the improvement of diagnosis quality as well as a fast assumption of responsibility with a filing of quality.

- More than 57% of various problems of the services of imagery reside at the level of the data and information management of the patients.
- The teleradiology is perceived by the doctors radiologists like a means of reducing displacements of patients and doctors (30% of the opinions) and also like a better access to the medical care in the badly served areas (30%).However 20%) think that it is a risk for the quality of the diagnoses.

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- 33,3% of the doctors radiologists find beneficial system PACS/RIS with many advantages in their professional life by the improvement of diagnostic quality as well as a fast assumption of responsibility with a filing of quality.
- Constraints related to the establishment of system PACS/RIS on the level of the centers of imagery of Cameroun;rest primarily on the significant cost of the project, farmhouse also to the worse quality of connection Internet.However 16,66% of the radiologists think that it is rather a problem involved in the maintenance of the apparatuses.
- These results in perfect harmony with those are obtained by the department of INTERACTIVE studies MARKETOR in France in 2007 in which 49% underlined like constraint with the installation of information systems a high cost of the project.[16].

With. Questionnaire intended for the technicians radiologists

45% of users had the age which varied between 19-28 years with a prevalence of the médico-medical engineers of male sex to a total value of 55%.

Concerning the aspect training in information system, 60,9% of the uses of the information systems did not receive a formation in this field.

About patient Dossier.

50% of the technicians frequently use the SIR but their use remained concentrated on visualizing the radiological images (75%) and reaching the patient files through portal of access (55%).

75% find easy to use of IF among which 90% use Si to visualize the images and 70% to reach the patient files through gate of access.

Within sight of these results we recorded a satisfaction of the technicians on the speed of use of IF to a total value of 70%.
It during the opinions remains divided on the confidentiality and the speed of access to information on the SIR.

General satisfaction was of setting that it is the network of image which for the RAdioX software. Furthermore, the satisfaction of the technicians on the quality of the data processing department enabled us to note that the data processing department influences on the quality of the services of the Information system to a total value of 65%.

100% of the users affirmed that IF had a positive impact on the productivity of the service of imagery and 90% think that it improves their effectiveness with work.

In more the hospital structure also will profit from many advantage binds to the use of the information systems by the increase in productivity as it is the example of the Institute Curie where in 2003, the film expenses rose with 500 000 euros per annum;but after the installation of the PACS in 2007, they were not any more but 20 000 euros (mainly for the mammographies) [11].

However, the points of improvement rest in 25% on accessibility with all with IF, on the speed of the execution of the spots, from where the wish for the technicians to have continuous trainings on the use of IF
In final analysis, the cost y related of the investment and the worse quality of connection Internet seem militated for this underutilization.And yet these systems have multiple advantages in saving of time, speed and reliability of the assumption of responsibility.Moreover, the cost of the information systems will reduce displacements of the patients, to avoid the loss of information which will impose a resumption of the examinations, a good filing with long terms, for a good follow-up bus with each examinations system PACS recovers the antecedents of the patient automatically and a greater productivity of all the chains medical and administrative.The hospital structure also will profit from many advantage related to the use of the information systems by the increase in productivity as it is the example of the Institute Curie where in 2003, the film expenses rose with 500 000 euros per annum;but after the installation of the PACS in 2007, they were not any more but 20 000 euros (mainly for the mammographies) [11].

V-Conclusion

At the end of this study of the information systems of the hospitals of references and regional centers of medical imagery (HGY, HGD, HRG), which had as specific objectives to arise the organization of IF in the aforementioned services, to identify the contributive elements with the performance of IF of these services and to evaluate the quality of the use of social and technical resources.

It arises that:

The user profile was made up in majority by a young population whose age varied between 19-28 years (45%);Among which we raise a prevalence of the médico-medical engineers of male kind (55%).

80% Radiologues doctors having taken part in our study were users of systems RIS/PACS.For the technicians, 75% of their use of the information systems rested on the visualization of the radiological images bus more half of these technicians never received a formation in this field.

Systems PACS/RIS contribute to the improvement of the working conditions (29,4%).For 42% of the users, these systems get a better diagnostic quality, which reduced considerably the rejections and the repetitions of the incidences (80%).

The analysis enabled us to raise that 34% of the systems are equipped with the module "management of the file of the patient".

All things considered, if the PACS finds already its anchoring in the hospital medium of our country, it is however necessary to raise an extremely significant need for equipment in information system.

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