

PAEDIATRIC SPECIFICITIES OF A RADIOLOGY DEPARTMENT: CASE OF THE GYNAECO-OBSTETRICS AND PAEDIATRIC HOSPITAL OF YAOUNDÉ (GOPHY).

Elsa Brenda Masso Waffo¹, Serge Honoré Tchoukouna^{1,2,3}, Anselme Michel Yawat Djogang^{2,3*}, Roméo Talla Fogang⁵, Steve Yannick Ngounou^{1,2,3}, Diane Mirianne Kapche Fotso^{1,3}, Stève Carole Ditchou Nganso³, Pierre René Fotsing Kwetché^{1,2,3} and Boniface Moifo⁴

¹School of Human Medicine, Higher Institute of Health Sciences, Université des Montagnes; Bangangté, Cameroon.

²School of Pharmacy, Higher Institute of Health Sciences, Université des Montagnes; Bangangté, Cameroon.

³Laboratory of Microbiology, Université des Montagnes Teaching Hospital; Bangangté, Cameroon.

⁴Department of Biophysics, Medical Imaging and Radiotherapy, University of Yaoundé I, Yaoundé, Cameroon.

⁵Radiology service of the Yaoundé General Hospital, Yaoundé, Cameroon.

Received date: 27 August 2020

Revised date: 17 September 2020

Accepted date: 07 October 2020

*Corresponding author: Dr. Anselme Michel Yawat Djogang

Laboratory of Microbiology, Université des Montagnes Teaching Hospital; Bangangté, Cameroon.

ABSTRACT

Paediatric radiology should be regarded as a specific domain in health management and not as adaptations of practices and materials from adults'. In that, paediatric environment and protocols should be adapted accordingly to enable optimal output in the sector with minimal irradiation. The general objective of the present study was to assess the paediatric peculiarities of the radiology department at the Gynaecological Obstetric and Paediatric Hospital in Yaoundé. A descriptive cross-sectional and analytical study was conducted from October 8th through to November 8th, 2018. Data related to the paediatric peculiarities of the service recorded with questionnaires and observation sheet, then analysed with the EPI Info. Data analysis highlighted a non-conformity of the environmental specificities and the absence of the material. These gaps had high impacts on the daily practice, notably the stress in children characterized by cries and agitation in the examination room, causes for long duration of the examinations and additional irradiation. Developing a room dedicated to paediatric radiography, associating a children playground to the service and acquiring restraint equipment would significantly contribute to improved quality results and safer practices in paediatric radiography at the Yaoundé's Gynaecological Obstetrics and Paediatric Hospital.

KEYWORDS: Radiology department, Yaoundé, Paediatric specificities.

INTRODUCTION

Paediatrics focuses on child development and disorders associated with medical conditions. Paediatric radiography a frequent practice which is much more observed among children aged 0 to 1-year owing to the fact that new-borns and infants are commonly affected by paediatric pathology.^[1] However, it is difficult to carry out examinations on children due to their lack of cooperation, lack of awareness of the importance of the procedure, limited appropriate physical environments and technical equipment.

Overall difficulties in carrying out radiographic examinations in paediatric patients are typically in connection with their lack of cooperation caused by change it to "The stress that children face with hospital environment some of which include personnels' attire,

invasive" and painful procedures and other direct contact with health personnel. These difficulties may be the source of bodily harms, poor quality pictures, and occasionally additional patients irradiation.^[2]

In addition, the repeated actions performed by the operators increase the workloads of technical staff, the duration of the procedure and could result in accidental irradiation of all parties.^[3] Acknowledging that children are more vulnerable to ionizing radiation and therefore, at higher risk of developing the stochastic effects associated with exposure than adults, it is important to take measures in order to avoid the recurrence of paediatric radiographic examinations. These measures should take into account the paediatric specificities of a radiology department, particularly environmental ones which include decoration of the examination room, attractive designs on the walls, the presence of toys,

coloured enlightenment, and play areas in the premises.^[1,3]

Some technological and technical specificities are also related to the adaptation of the equipment for paediatric practices. These include a remote-controlled mobile examination tables and adequate stands, the means of restraint used and to the technical staff on duty.

If in industrialized countries these requirements are more or less met, the low purchasing power in most developing countries do not allow possibilities to put in place the minimal amenity required. Most often, the non-improvement may not be directly linked to the purchasing power of populations but more likely to databases that could help advocate implementation of acceptable standards which come as results of evaluation submitted to decision makers. In most developing countries like Cameroon, X-ray rooms are most often designed to be used for children and adults, making paediatric examinations difficult. The present survey was initiated in order to evaluate the paediatric specificities of an X-ray department at the Yaoundé Gynaeco-Obstetrics and Paediatric Hospital. The results will guide improvement of the services to the general population, one of the most important priorities of the Ministry of Public Health and the State of Cameroon.

MATERIAL AND METHODS

Study Site, study population and ethical consideration,

The present investigation was conducted in the premises of the Imaging Department of the Gynaeco-Obstetrics and Paediatric Hospital of Yaoundé (GOPHY), Centre Region of Cameroon. This hospital was chosen for its university teaching capacities, a hospital specialized in the management of infant and children's conditions and pathologies.

Field data collection

This descriptive and transversal study was conducted over a period of 12 months (November 2017 through November 2018). Research authorizations and ethical

consideration were previously met with the Higher Institute of Health Sciences, Université des Montagnes under reference N°: 2018/219/UdM/PR/CIE and the Head of the Gynaeco-Obstetrics and Paediatric Hospital of Yaoundé under reference N°: 776/CIERSH/DM/2018 for data collection. The target participants were any patients aged 1 to 10 years who came in for chest and abdomen examinations without preparation. Data collection was thereafter, thereafter, undertaken with the signed consent form from patient's parents or guardians. Data collection was probabilistic and consecutive.

Initially, data collection consisted in listing and assessing the equipment available, the environment and the type of personnel assigned using an observation grid. Pieces of information were inserted in terms of score which were either "0 for absence" or "1 for presence" of required paediatric equipment. Assessment of the environmental specificities focussed on the decoration of the room, the walls, the presence of toys and the playgrounds associated with the operating premises while technological specificities were based on the equipment; the technical aspects on the means for restraint and the technical staff on duty.

In a second step, influence of absence of certain elements was deducted from the data related to the duration of examination, the number of repeats, the number of people mobilized for thorax and abdomen examinations without preparation, the use of the diaphragm. All related data were recorded on a pre-established technical sheet. The data analysis was carried out with EPI Info version 7.2.2.2.6 and the results obtained are presented in the form of tables, graphs and texts.

RESULTS

Specificities of the radiology department of the Gynaeco-Obstetrics and Paediatric Hospital of Yaoundé.

Environmental specificities

The environmental working procedures and related data analysis yielded data that are summarized and displayed in table I.

Table I: Presentation of the environmental specificities of the paediatric radio service of the GOPHY.

T	Present	Score
Decoration of the room	No	0
Walls with attractive designs	No	0
Toys	No	0
Playgrounds attached to the service	No	0
Adapted furniture	No	0
Total	-	0

For the working environment, the total score was 0. This is because, the environmental requirements were not met at the GOPHY radiology department. In fact, the walls and the room were plainly designed like that for adults are, and did not have anything that could attract children

during the procedures (no specific attractive decoration). There was no playground for children.

Technical and technological specifications

Means of restraint

When different means of restraint expected to be available in a radiology department were assessed, data collected were summarized as shown in Table II.

Table II: Presentation of the means of restraint of the radiology department of the GOPHY.

Modalities	Present	Score
Loved Wheel	No	0
Pr Lefebvre's baby carrier	No	0
Restraint cradle	No	0
Sandbags	No	0
Gang Velcro	No	0
Pigg o stat	No	0
Remote-controlled table with hooks	No	0
Locally manufactured equipment	No	0
Total	-	0

It comes out from the table that the radiology department of the GOPHY did not have any restraint equipment, not even the ones that are locally made.

Personnel

A glance on the technical staff performing the examinations yielded the following results in relation to the number of staffs, temper and number of years of experience.

Overall, 08 technicians worked with high attention for the children in the premises. Predominantly males, their working experiences varied globally from 11 through 19 years.

Apart from the caring and patient nature of the staff, the radiology department of the HGOPY did not meet any compliance criteria related to the paediatric specificities of a radiology department as recommended by the norms.

Influence of the non-specificity of the GOPHY radiology department on the performance of examinations

Once the impact of overall state of the premises on the examinations was assessed on the study population (51

patients), data on age and sex were presented as shown in Table III.

Table III: Gender distribution.

Population	Size	Frequency (%)
Male	27	52.94
Female	24	47.06
Total	51	100

The overall frequencies in both sexes were similar. Their ages ranged from 1 through 99 months with an average of 37.37 months.

Child's language development and status before the examination

Language development

Data related to whether the children could understand the instructions, speak, or obey the orders, were summarized and displayed as shown in the figure 1.

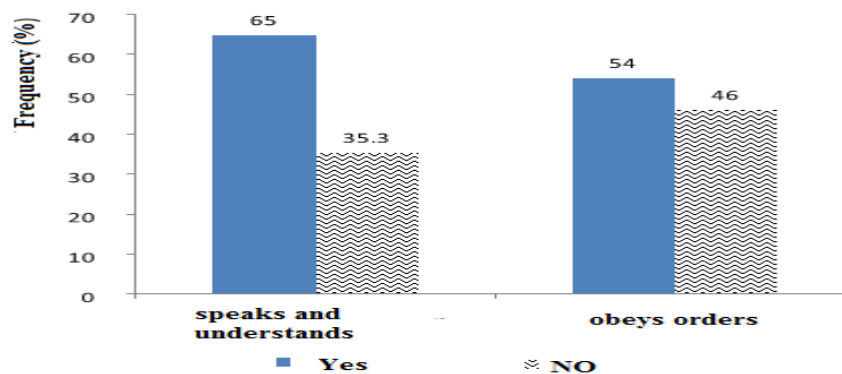


Figure 1: Patient language development.

Overall, the number of patients that could speak and understand was relatively larger than those who obeyed the instructions from the operators.

Children’s attitude before entering the examination room

Regarding the child's emotional state before he got into the examination room, data recovered were summarized as displayed in Table IV.

Table IV: Condition of children before entering the examination room.

SEX	GIRLS	BOYS
State	Number of employees (%)	Number of employees (%)
Amused	2 (8.33)	2 (7.41)
Calm	15 (62.50)	17 (62.96)
Crying	7 (29.17)	8 (29.63)
Total	24 (100)	27 (100)

The majority of children were calm before entering the examination room, 62.50 % of girls and 62.96 % of boys. Overall, boys and girls appeared to display similar temper.

a) Children’s attitude in the examination room

The diagram below (figure 2) shows the child's condition once in the examination room

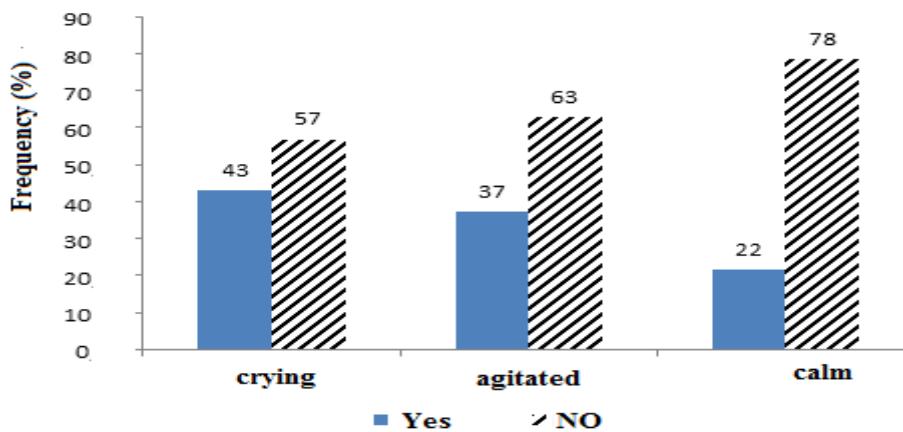


Figure 2: Children attitude in the examination room.

The overall behaviour varied, but very few were calm during the procedure. Most of the time; they were cried and/or were agitated.

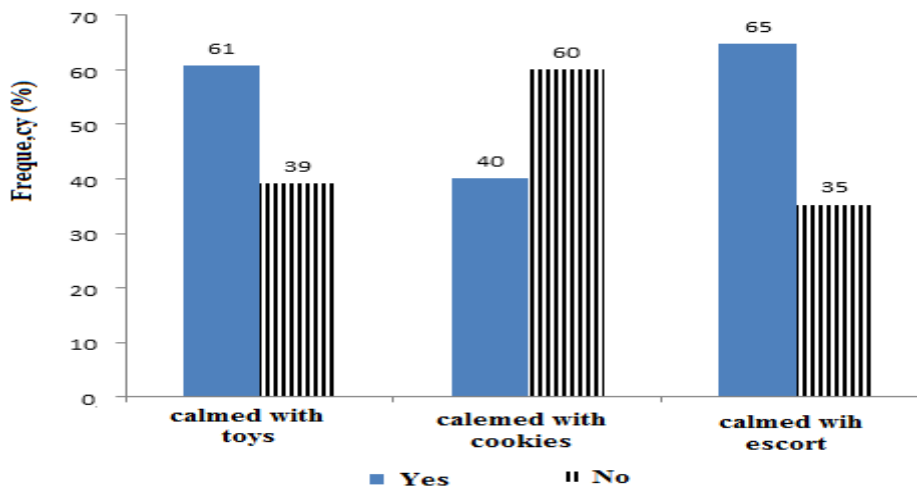


Figure 3: Means used to soothe children.

Most children are calmed with the use of companions and toys.

Time taken per examination depending on the condition in the examination room

Depending on the condition of the children in the room, the duration of the examination varied more or less. The following table (V) shows this variation in time.

Table V: Time taken per examination according to the condition in the room.

Time duration (Minutes)	Agitated	Agitated and crying	Calm	Cries
	Number of Participants (%)	Number of Participants (%)	Number of Participants (%)	Number of Participants (%)
2	2 (11.11)	0	6 (54.55)	2 (9.52)
3	4 (22.22)	0	1 (9.09)	1 (4.76)
4	6 (33.33)	1 (100)	3 (27.27)	8 (38.10)
5	3 (16.67)	0	0	7 (33.33)
6	2 (11.11)	0	1 (9.09)	2 (9.52)
15	0	0	0	1 (4.76)
20	1 (5.56)	0	0	0
TOTAL	18(100)	1 (100)	11 (100)	21 (100)

The average duration of the examination was 4 to 5 minutes for 71.43% of children crying in the examination room and 4 to 5 minutes for 50% of agitated children.

b) Regions exposed to radiation based on the examinations requested

The body location exposed based on the reviews of the type of review were identified. Table VI provides details of pieces of information recovered.

Table VI: Areas exposed during chest and Abdomen without preparation x-rays of children in GOPHY.

Review requested / Exposed area	Thorax	Abdomen without preparation	Whole body	Total (%)
Thorax	3 (6.52)	0	0	3 (5.89)
Thoraco-abdominal	41 (89.13)	1 (25)	0	42 (82.35)
Abdomen	0	1 (25)	0	1 (1.96)
Whole body	2 (4.35)	2 (50)	1	5 (9.80)
Total	46 (90.20)	4 (7.84)	1 (1.96)	51 (100)

Out of the 46 patients from whom a frontal chest X-ray was requested, the thoracic region was explored in 3, the thoraco-abdominal region explored in 41 and the whole body in 2 of cases. With regards to abdomen without preparation, of the 4 expected, the abdomen was explored in 1 and the entire body in 2 examinations. The diaphragm was used for 96% of children.

DISCUSSION

Paediatric imaging has specific features, particularly environmental ones that consist in making the physical settings attractive to children. According to Alan Dilani *et al*, environmental quality is essential to health and well-being. As it would stimulate and mobilize individuals psychologically and socially; it is a mental process that requires attention by reducing anxiety and developing positive emotions.^[4] In the same vein, Ancelot *et al* said observed that paediatric radiography requires a friendly, light atmosphere, appropriate furniture, soothing colours, pleasant decoration, and the

presence of toys right to the examination room. According to these authors, All these commodities contributes to reducing stress and pain in the child.^[5] However, the radiology department of the GOPHY did not met the basic of these environmental requirements. The total environmental score value of zero reflects non-compliance with required specificities in a radiology department. In fact, the walls and the radiography room were decorated like those expected for adults. In addition, there was no playground associated to the service as recommended in such instances.

Environmental features are not the only specificities of a paediatric radiology department. At the technical and technological level, the radiology department of the GOPHY did not have any restraint equipment, not even the locally made (i.e. a score of 0). Ideally, restraint equipment such as the "Aimé wheel", the bib and brace panties, the remote-controlled table support cradle, sand bags and Velcro tape, the "Pigg o stat" are recommended

to keep children calm during examinations. These is used to avoid the retaking of X-ray images which is a cause of additional and unjustified radiation. The absence of restraint equipment at GOPHY is difficult to understand in order to afford any explanation, because the working staff had good knowledge of their role, then cannot simply due negligence, shortage of financial resources as alleged by others.^[5,6] This issue requires new investigation strategies to be tackled sustainably.

To determine the impact of the paediatric non-specificity of the GOPHY radiology department, we followed 51 children (1 to 99 months) who required an X-ray examination of the chest or abdomen, predominated chest X-rays. We observed that before they taking into the examination room, 62.73% were calm, 44% were crying and 38% were agitated. In fact, agitation was commonly associated with cries. These attitudes could be justified, at least in part the general feature of the hosting environment that was not adjusted to children.^[7] and further explain the frequencies to retaking. Although 65% of these children could speak and understand, the non-specificity of the service and the absence of restraint equipment made it difficult to carry out the examinations. That most likely the raison why the thoracic-abdominal area was the most irradiated (82.35% of cases). This resulted in a longer duration of the process in this study (average 4.41minutes instead of 1 minute as recommended). Not only longer predisposes to additional irradiation, but also increases the workload, reduces the number of patients to be examined. The financial outcome (who pays the price) is also one of the most important aspect in this scenario. All these aspects are yet to be screened through seriously.

CONCLUSION

Overall, it appears that the radiology department of the Gynaeco-Obstetrics and Paediatric Hospital of Yaoundé does not have the recommended characteristics. This limitation has relevant impacts on daily activity that, in turn, results in stress in children, prolong duration and additional radiation and financial burden.

ACKNOWLEDGEMENTS

The authors are thankful to the heading authorities of Université des Montagnes and the Gynaeco-Obstetrics and Paediatric Hospital of Yaoundé for invaluable support during this survey. They are also highly indebted to the “Association pour l’Education et le Développement” (AED) the for literature and educational resources for the training of students. Special thanks to WAFFO Léopold Sédar Senghor for financial support.

REFERENCES

1. Agoda-Koussema LK, Adjenou K V, Gbadoe K, Guedeoussou T, Awobanou KM, N’dakena KG. La radiographie thoracique standard dans la pratique de la radiopédiatrie a propos de 102 cas colliges aux

Chu de Lome. J la Rech Sci l’Université Lomé, 2006; 8(2).

2. Vano E, Faulkner K. ICRP special radiation protection issues in interventional radiology, digital and cardiac imaging. Radiat Prot Dosimetry, 2005; 117(1–3): 13–7.
3. AGODA-KOUSSEMA LK, Koffi KS, Adjenou K V, Afansounoudji A, Amouzou K, Awobanou K, et al. La pratique de la radiopédiatrie conventionnelle au TOGO A propos de 580 cas colliges aux CHU de LOME. J Africain d’Imagerie Médicale, 2014; 5(1).
4. Dilani A. L’Influence Du Design Et De l’Architecture Sur La Santé. HealthManagement, 2012; 5(2): 1–8.
5. Le Dosseur P, Ancelot C, Gaillon C, Delmon P. Intérêt de l’utilisation en routine du MEOPA pour la cystographie rétrograde chez l’enfant-Tunis, Tunisie 17-18 septembre 1999. J Radiol, 2000; 81: 255268.
6. Schmit P, Kalifa G, Devred P. Participation parentale en radiologie pédiatrique. J Radiol, 1996; 77: 60–3.
7. Fleisher G, Ludwig S, McSorley M. Interpretation of pediatric x-ray films by emergency department pediatricians. Ann Emerg Med, 1983; 12(3): 153–8.